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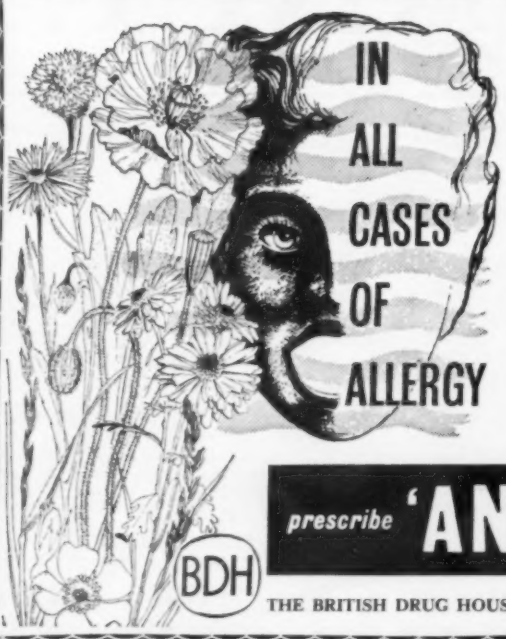

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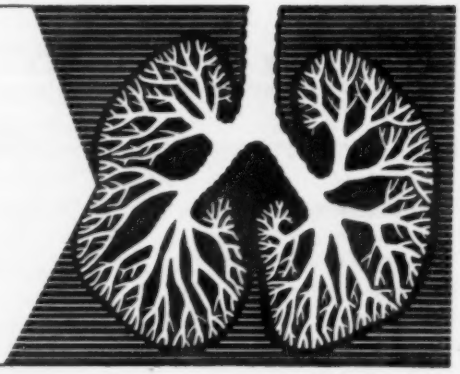

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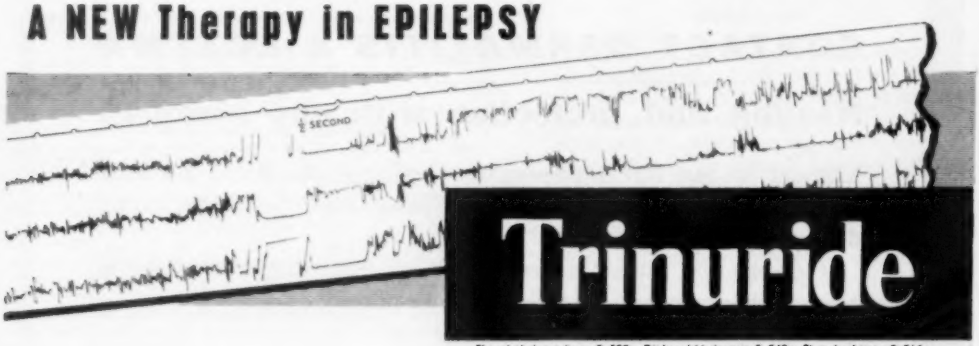

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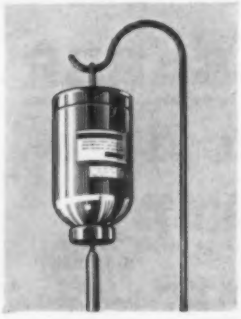

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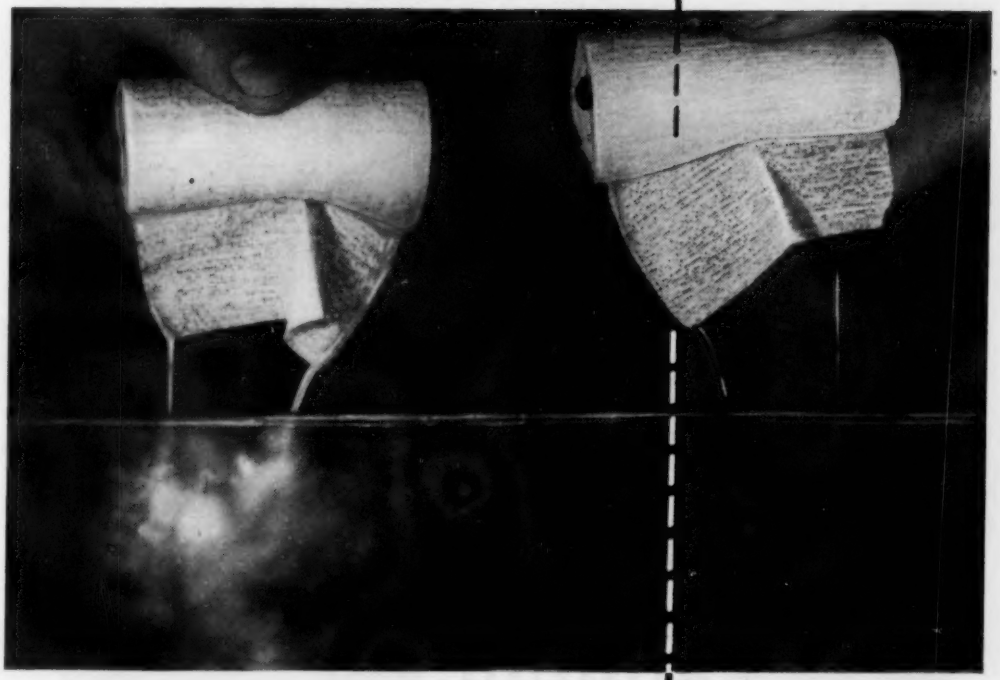

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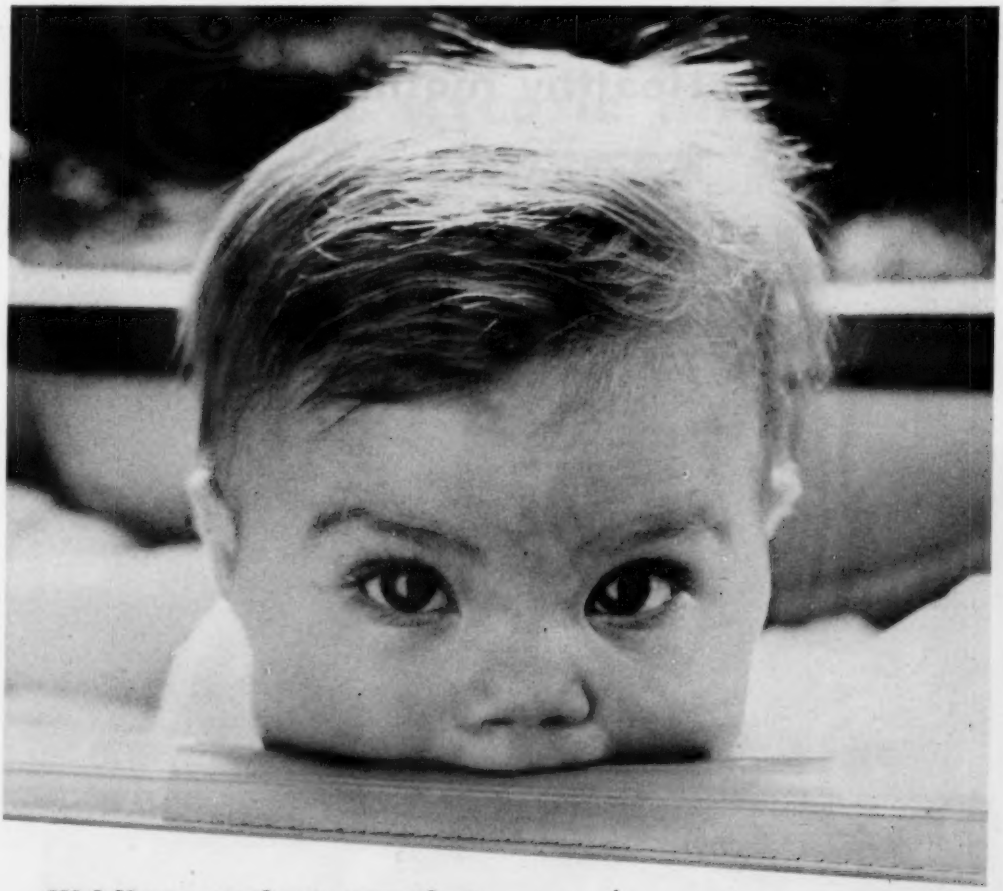

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Packs of 60, 120 and 1,000. Basic price to N.H.S. 1,000 tablets 32/9.

VITAVEL SYRUP *for children*

The delicious flavour of Vitavel Syrup solves the problem of ensuring continuity of treatment where supplementation is indicated.
Basic price to N.H.S. 6 fl. oz. 2/6, 40 fl. oz. 16/-.

BEMAX *for all ages*

Bemax is stabilized wheat germ — the richest natural vitamin-protein-mineral supplement.

VITAMINS LIMITED (DEPT. B.6), UPPER MALL, LONDON, W.6

ATHLETE'S FOOT AND OTHER SUPERFICIAL MYCOTIC INFECTIONS

'Glyped' CREAM provides an entirely new mode of attack

Non-irritating · non-sensitising · odourless · inconspicuous in use

'Glyped' Cream offers a new approach to the control of Athlete's Foot and other superficial dermatophytoses. It contains glyceryl triacetate, which provides effective antifungal therapy by means of a self-controlled enzyme action on the skin. Free fatty acid is released and maintained at a constant level within a pH range of the optimum therapeutic effect and this is non-irritating to the tissues even over long periods.

The clinical effectiveness of 'Glyped' Cream against a number of common dermatophytic conditions has been confirmed by workers in the Dermatological Department of the University of Wisconsin, U.S.A.*

'Glyped' Cream contains 25% glyceryl triacetate in an emollient cream base. Literature and further information are available on request.

*A.M.A. Arch. Dermatol (1956). 74. 73.

'Glyped' CREAM

Issued in 25 gramme collapsible tubes

Manufactured under licence from Wisconsin Alumni Research Foundation; patent applications pending.

Made in Great Britain by IMPERIAL CHEMICAL INDUSTRIES LIMITED Pharmaceuticals Division Wilmslow Cheshire
Ph 835

Summer has set in with its usual severity . . .

(Coleridge 1826)

At this time of the year airborne pollen brings acute discomfort to many people.

Pabracort Insufflations have proved their value in the treatment of Hay Fever by clinical trial and in general practice. Dramatic relief is usually obtained within two or three days and complete alleviation after two weeks' treatment.

Reference: *Lancet (1956) i.,537.*
Lancet (1955) i.,234.
Proc. S.M. Mayo Clinic. Vol. 32 No. 22, 30, 10, 1957.

FORMULA *Each insufflation capsule contains 15 mg. hydrocortisone acetate in a specially prepared snuff base.*

PACKINGS *Pabracort outfit (10 capsules and insufflator)*
Capsules: 10, 25, 100.

PABRACORT

INSUFFLATIONS

PAINES & BYRNE LTD., PABYRN LABORATORIES, GREENFORD, MIDDX.

NEW!
FOR THE DOCTOR WHO NEEDS SOMETHING BETTER...
A NEW EASY-TO-REMEMBER NAME
A NEW TYPE OF IRON COMPOUND
100
FERROIDS
'Ferroids' are different. They contain iron aminoates, a compound of unusual interest formed by chelating iron with amino acids. 'Ferroids' ensure the best possible therapeutic results because of the high utilisation of iron without gastro-intestinal upset.
COMPOSITION
Each golden yellow tablet contains:
Iron Aminoates 350 mg.
Aneurine Hydrochloride 1 mg.
PACKS
Tins of 100
Tins of 1,000
Basic Cost to N.H.S.
6/8d. and 54/8d. plus P.T.
DOSE: 1 or 2 tablets three or four times a day.
Send for literature and samples.
'Ferroids' is a Registered Trade Mark of
RIKER LABORATORIES LIMITED
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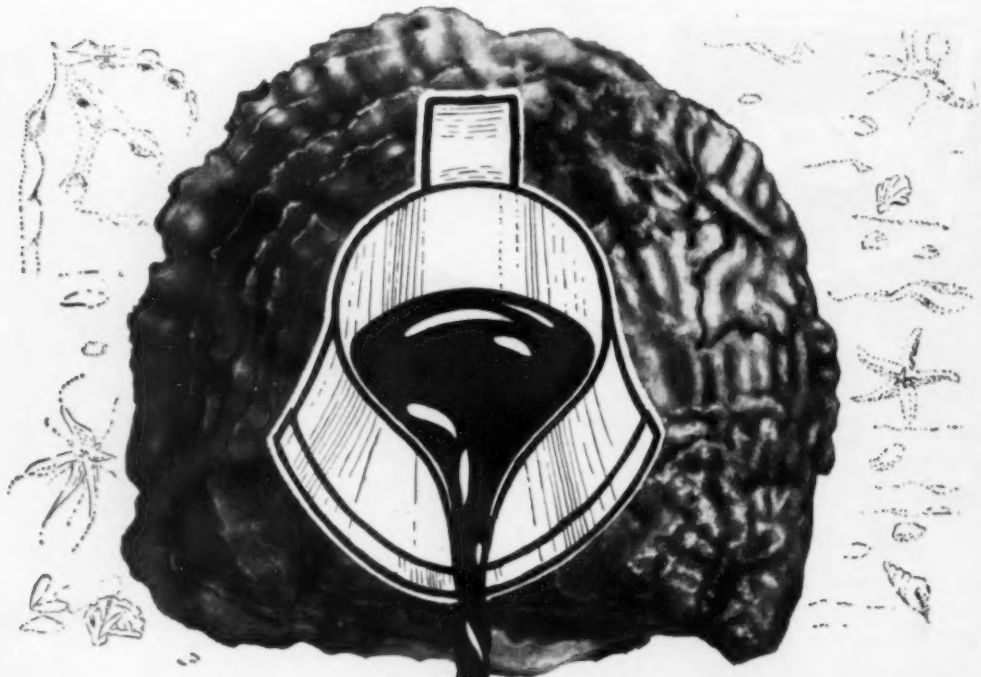


OIL OR OYSTERS

(and many other things)

can cause

allergic dermatoses

'HYDROMYCIN LOTION' or
(Hydrocortisone plus Neomycin)

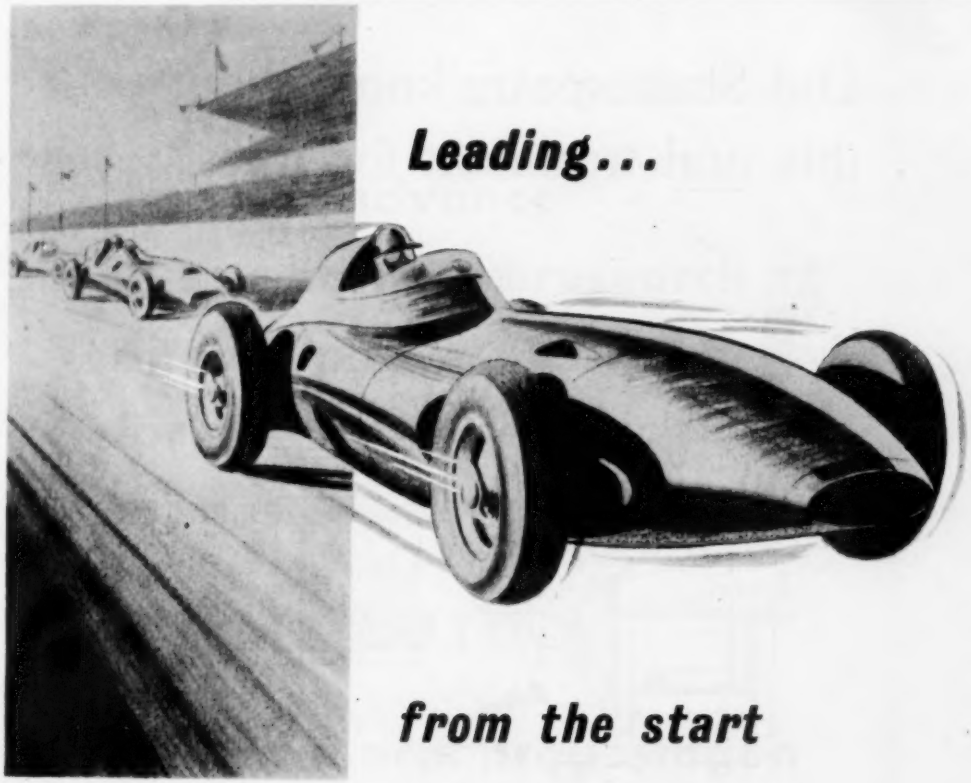
'HYDROCORTISTAB LOTION'
(Hydrocortisone)

provide prompt relief

Boots

Detailed literature gladly sent on request

BOOTS PURE DRUG CO. LTD. · NOTTINGHAM · ENGLAND



Leading...

from the start

'V-CIL-K' brand penicillin V potassium gets off to a quick start with absorption rates so rapid that peak blood levels are achieved within thirty minutes. Moreover, these levels are consistently higher than those given by any other kind of oral penicillin. Fully effective orally, 'V-CIL-K' combines the rapidity of the parenteral route with all the advantages of oral treatment.

The dose is 125–250 mg. four times daily. Available as tablets of 60 mg., 125 mg. and 250 mg.

'V-CIL-K'

PENICILLIN V POTASSIUM

Lilly

ELI LILLY & COMPANY LTD · BASINGSTOKE · ENGLAND

15

Did Shakespeare know about this oral treatment for Piles?

" . . . And telling me the sovereign'st thing on earth
*Was parmaceti for an inward bruise." **

Henry IV, Part 1, Act 1, Scene III, Line 58

Parmacetyl tablets contain cetaceum, a wax obtained originally from the head of the sperm whale and known as parmaceti in Elizabethan times.
Cetaceum passes down the gut unchanged except that it becomes 'tacky' at body temperature. It has a demulcent effect when it arrives at the rectum and anal canal. One course of these Tablets will remove pain and check bleeding in most attacks of 'acute piles' without masking any more serious underlying pathology.

Parmacetyl is prescribable on Form E.C.10. Basic N.H.S. price 2s. 1d. Dosage is on every tube of 12 tablets. For information and sample, please write to manufacturers.

* *Reference: The Practitioner, February 1957. Report of a successful trial at a London hospital. A summary of this article is available on request.*

PARMACETYL Tablets

for the oral treatment of piles and allied conditions

E.G.H. LABORATORIES LTD · PERU STREET · SALFORD 3 · LANCS

A major advance in sex hormone research opens up new possibilities for oral progesterone therapy

PRIMOLUT N

Nor-ethisterone

Powerful oral progestagen of unequalled efficacy Many times more active than ethisterone

Original packing containing 30 tablets each of 5 mg nor-ethisterone.

Schering A.G. Berlin

Sole Distributors for the U.K.: **Pharmethicals (London) Ltd.,**
20, Gerrard Street, London W 1

Distributors for Eire: H. E. Clissmann, 20 Merrion Square, Dublin

wide range

penetration

sustained power

in infections of the THROAT & MOUTH

Phenidex lozenges have an unusually wide range of antibacterial activity, and rapid spreading and penetrating properties. Their effect lasts from 45 minutes to an hour.

They effectively control moderate infection caused by all common throat and mouth pathogens, including the ubiquitous *Candida albicans*.

Phenidex lozenges quickly soothe the inflamed tissues. They are pleasant to take and equally suitable for adults and children.

PHENIDEX lozenges

EACH LOZENGE CONTAINS:

Tyrothricin	0·5 milligrams
Cetyl pyridinium chloride (C.P.C.)	2·5 milligrams
Benzocaine B.P.	5·0 milligrams

PACKING: Cartons of 18 lozenges sealed in metal foil. Basic N.H.S. cost 1/4d.

C. L. BENCARD LTD. PARK ROYAL, LONDON, N.W.10

(301/78/1)

ENAVID*

BRAND OF NORETHYNODREL AND ETHYNYLOESTRADIOL 3-METHYL ETHER

For the specific control of menstrual irregularities

ENAVID, containing the new Searle steroid norethynodrel, permits *specific* and usually complete *control* of the menstrual cycle on *oral* administration and thus provides effective therapy for most menstrual irregularities.

ENAVID has strong progestational and a lesser oestrogenic activity on the endometrium, which stimulates its development to a secretory phase. It also inhibits the secretion of gonadotropins by the anterior pituitary gland.

SEARLE

ENAVID is therefore recommended for:

- **AMENORRHOEA** (Primary and Secondary)
- **OLIGOMENORRHOEA**
- **MENORRHAGIA**
- **METRORRHAGIA**
- **DYSMENORRHOEA**
- **PREMENSTRUAL TENSION** and the
- **"INADEQUATE LUTEAL PHASE"**

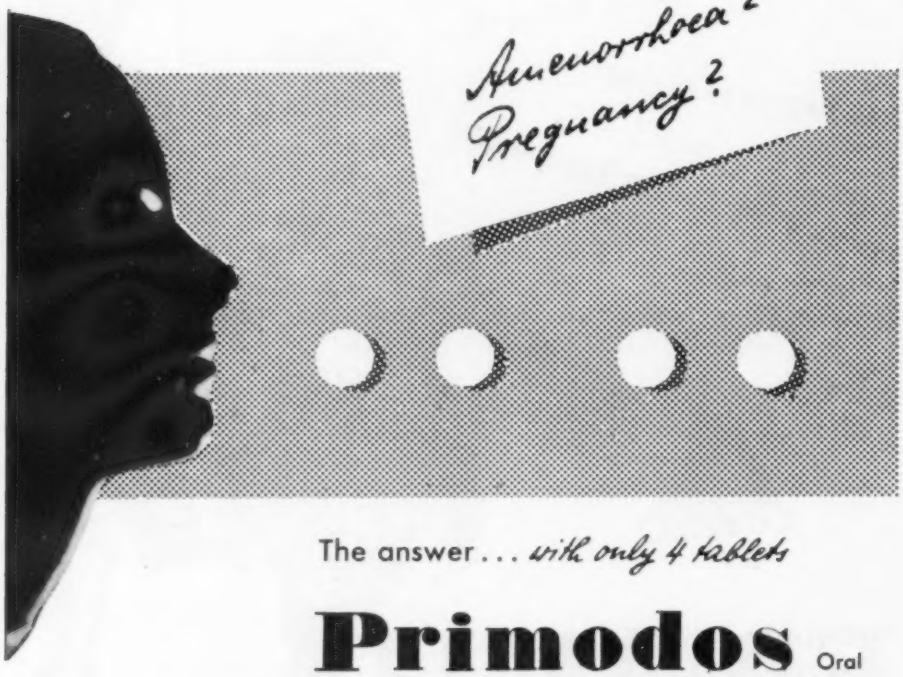
ENAVID is supplied as 10 mg. tablets in bottles of 20 and 50 tablets.

Detailed literature is available on request.

* *Trade Mark.*

G. D. SEARLE & CO., LTD., HIGH WYCOMBE, BUCKS. Tel. High Wycombe 1770

EN : P117



The answer . . . *with only 4 tablets*

Primodos Oral

containing the **new powerful** oral progestagen **Nor-ethisterone.**

The administration of 2 tablets Primodos on each of 2 consecutive days in cases of amenorrhoea of short duration causes a bleeding resembling a true menstruation after 3-6 days. If bleeding does not occur pregnancy is highly probable.

Original Packing: 4 tablets each containing 10 mg nor-ethisterone and 0,05 mg. ethinyl-oestradiol

Prescribable on N.H.S. Form E.C. 10

Samples and literature available upon request

SCHERING A.G. BERLIN

Sole distributors for the U K. Pharmethicals (London) Ltd
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Primodos is marketed in Eire as DUOGYNON Oral

To lower the level of Serum Cholesterol

ARTEROCHOL

TRADE MARK

ESSENTIAL UNSATURATED FATTY ACIDS AS FOUND IN CORN OIL PLUS PYRIDOXINE HYDROCHLORIDE.

It has now been established that the level of cholesterol in the blood can be reduced significantly by an intake of the unsaturated fatty acids (as found in corn oil).

The pyridoxine hydrochloride is concerned with the conversion of the linoleic acid to arachidonic acid in the body.

Active ingredients in each tablespoonful of pleasantly flavoured emulsion:
Essential unsaturated fatty acids in 8.33 grams corn oil
Pyridoxine hydrochloride 0.6 milligram

Available in 12 fl. oz. bottles and also for hospitals in 80 fl. oz. Winchesters.

Samples and literature on request.

WARD, CASSON LTD. 15 HAY HILL LONDON W.1

TACE

IN THE MENOPAUSE

UNIQUE FAT STORAGE

Most of the advantages of 'TACE' are derived from its storage in body fat. Pharmacological evidence has been provided by articles published [1] [2], and from results demonstrated by radio autographs. Abundant clinical confirmation is also available.

No other œstrogen at present available has this property. Because 'TACE' is stored in body fat no sudden drop in œstrogen blood level occurs. The œstrogenic effect persists for up to 3 months after administration ceases.

High doses are unnecessary, since 'TACE' is metabolised by the liver to a more potent œstrogenic compound.

1. *Amer. J. Obst. Gynec.* (1952) **63**:1361.
2. *Proc. Soc. exp. Biol.* (1953) **84**:491.

DOSE: 2 capsules daily for one month.

PACKS: 'TACE' is available as green capsules, each containing 12 mgm. chlorotrianisene dissolved in oil: Bottles containing 60 and 300 capsules. The basic N.H.S. costs are 18/4d. and 73/-.

Feeling of Well Being

The feeling of well being, so important to the patient, is characteristic of 'TACE' therapy.

Smooth Prolonged Action with Fewer Side Effects

Fat storage results in a steady release of œstrogen, providing a smooth action which persists for some time after administration has ceased.

Low Incidence of Withdrawal Bleeding

Owing to the gradual release of the fat stored 'TACE', no fluctuations occur in blood œstrogen levels. Withdrawal bleeding consequently is greatly diminished.

Simplicity of Dosage

'TACE' is given on a fixed dosage scheme. Higher dosage does not produce greater fat storage.

Merrell Research

'TACE' is a registered trade mark of the Wm. S. Merrell Co., London. Distributed in Great Britain and Irish Republic by

RIKER LABORATORIES LIMITED · LOUGHBOROUGH · LEICS.

"Here's a health unto His Allergy!"

Sandosten Effervescent Tablets

BY **SANDOZ**

25 mg. thenalidine tartrate
0.579 g. calcium lactate
0.794 g. calcium gluconate

anti-allergic, anti-pruritic

The effervescent anti-allergic drink

Samples upon request

Sandoz Products Limited

Sandoz House
23 Great Castle Street
London, W.1

23

These are the advantages of

Calcium B-PAS WANDER

and

B-Pasinah WANDER

(calcium B-PAS Wander plus isoniazid)

in the

Chemotherapy of Tuberculosis

B-PAS (Wander), 4-benzoylamino-2-hydroxybenzoic acid, first introduced by our Research Laboratories in 1948, is the drug of choice in regimens comprising PAS in concurrent therapy.

In the form of its calcium salt, it provides extended bacteriostatic levels, induces only minimal side-effects as compared with sodium PAS, and because of its high acceptability guarantees as far as possible that patients, particularly on domiciliary treatment, do take their medication.

Available in 3.5 g. envelopes and in 1 g. cachets; and as bulk powder.

'B-PASINAH' is available in two convenient forms:

Powders each containing 3.5 g. calcium B-PAS (Wander) and 87.5 mg. isoniazid.

Cachets each containing 1 g. calcium B-PAS (Wander) and 25 mg. isoniazid.

Full abstracts from literature, also details of institutional packs and prices from the Medical Department

A. WANDER LTD., 42 UPPER GROSVENOR ST., GROSVENOR SQ., LONDON W.1

M.400

Nacton

(Compound I.S.499)

SUPPRESSES ACID SECRETION

All day and all night control of gastric acid in peptic ulcer is made possible by a dose of NACTON 3 times a day—and one at night.

NACTON selectively reduces gastric secretion by as much as 70%, providing fundamental, long-term and specific control of hyperacidity, not merely relief of symptoms.

in peptic ulcer

EACH TABLET CONTAINS	2 mg. of (1-methyl 2-pyrrolidyl) methyl benzilate methyl methosulphate

PACKAGES & BASIC N.H.S. COST	50 tablets	4s. 4d.
	250 tablets	20s. 0d.

A PRODUCT OF BRITISH RESEARCH

1901/60/3

C. L. BENCARD LTD. PARK ROYAL, LONDON, N.W.10

Roussel Laboratories announce

A MORE POTENT ALTERNATIVE

to topical hydrocortisone

PreCORTISYL

PREDNISOLONE

SKIN CREAM AND SKIN LOTION

(0.5%) (0.25%)

A true SOLUTION of water-soluble prednisolone in water-miscible vehicles.

AT LEAST TWICE AS POTENT

as hydrocortisone on the skin

HALF THE CONCENTRATION IS REQUIRED

"Thus in 99 out of 128 cases (77%) the prednisolone alcohol was more effective than, or equally effective as, the hydrocortisone free alcohol, although it was used in one-half the concentration of the latter."

J. Amer. med. Ass., 1956, **162**, 1381.

PACKINGS

PreCortisyl Skin Cream 0.5% — 5G. and 15G. tubes
PreCortisyl Skin Lotion 0.25% — 20 ml. plastic bottles

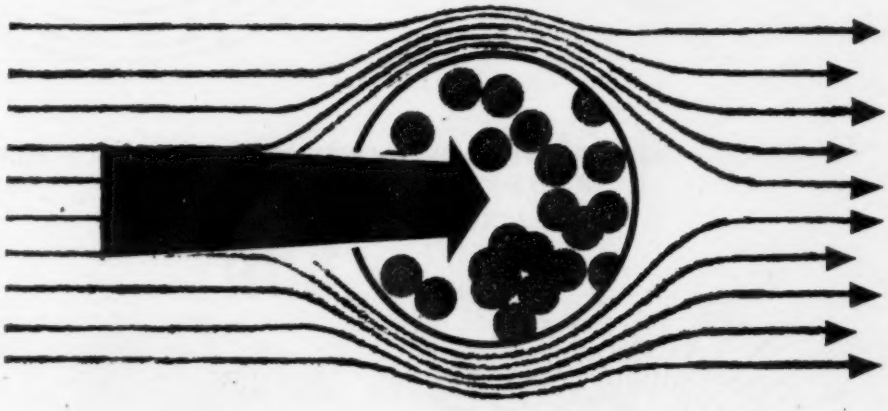
ROUSSEL

LONDON, N.W.10.
LADbroke 6611

LS/54

BIOTEXIN the oral antibiotic

with rapid and intensive antibacterial effect



Biotexin (novobiocin sodium Glaxo) is the antibiotic that will deliver an overwhelming knock-out blow even to 'last-ditch' resisters.
Given by mouth, well absorbed and well tolerated, it produces high, sustained and selective antibacterial activity in the blood more rapidly than any other oral antibiotic.
Biotexin can be successfully used in the treatment of septicaemia, staphylococcal enterocolitis, infections of the soft tissues and other conditions that may be caused by staphylococci.

BIOTEXIN Novobiocin sodium Glaxo

TRADE MARK

Tablets 125 mg. Bottles of 32 and 100

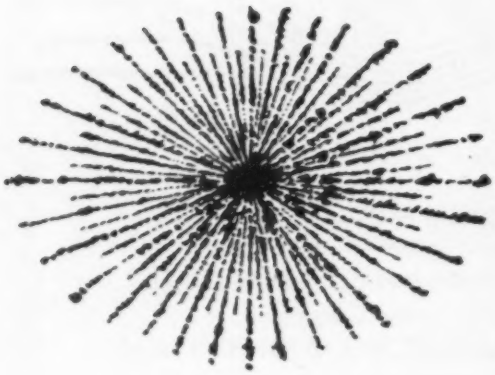
GLAXO LABORATORIES LTD., GREENFORD, MIDDLESEX

BYRon 3434

Subsidiary Companies or Agents in most countries

for the overweight patient in whom apathy and lethargy are predominant

Dexedrine Spansule



for the overweight patient in whom anxiety and tension are predominant

Drinamyl Spansule

Smith Kline & French Laboratories Ltd Coldharbour Lane, London SE5

Each 'Dexedrine Spansule' contains 10 or 15 mg. 'Dexedrine' (dexamphetamine sulphate BPC) according to strength.
Each strength No. 1 'Drinamyl Spansule' contains 10 mg. 'Dexedrine' and 65 mg. (gr. 1) amylobarbitone.
Each strength No. 2 'Drinamyl Spansule' contains 15 mg. 'Dexedrine' and 97 mg. (gr. 1½) amylobarbitone.

'Dexedrine', 'Drinamyl' & 'Spansule'* are trade marks. *Brit. Pat. Nos. 715305 and 742007

SDSDL.PA108

safe sedation and sounder sleep

DISTAVAL
FORTE

DCBL

- **An entirely new *non-barbiturate* sedative and hypnotic**
- **No known toxicity and free from untoward side-effects**
- **Tasteless**
- **Calms without euphoria or initial excitement**
- **Particularly suitable for children and the aged**

DISTAVAL

Scored tablets of 25 mg.

Basic Cost to N.H.S. of 12 tablets from dispensing pack of 100 (including Purchase Tax)—1s. 3½d.
Tube of 24 and Bottles of 100 and 500.

DISTAVAL
Forte

Scored tablets of 100 mg.

Basic Cost to N.H.S. of 12 tablets from dispensing pack of 100 (including Purchase Tax)—3s. 5½d.
Tube of 12 and Bottle of 100.

FOR SEDATION:
Adults: One 25 mg. tablet 2 or 3 times a day
Infants and Children: Half to one 25 mg. tablet, according to age, 1 to 3 times a day

AS A HYPNOTIC:
One 100 mg. tablet 20 minutes before retiring

THE DISTILLERS COMPANY (Biochemicals) LIMITED
BROADWAY HOUSE, THE BROADWAY, WIMBLEDON, LONDON S.W.19
Telephone: Liberty 6600
Owners of the trademark DISTAVAL

PPH 1 58

full sulphonamide effect

In all infections responsive to sulphonamide therapy **MIDICEL*** affords advantages of potent antibacterial action, a high level of free active sulphonamide in the circulation and a low incidence of undesirable side-actions

maintained around the clock

Because of its exceptionally prolonged action a bacteriostatic blood-level is maintained with only once daily administration of **MIDICEL**, thereby permitting the patient more rest during the day . . . undisturbed sleep through the night.

with one dose daily

*Trade Mark

Midicel

SULPHAMETHOXYPYRIDAZINE

Dosage: In adults an initial loading dose of 1 G (in severe infections, 2 G) followed by 0.5 G daily will generally be found effective. In some instances it may be desirable to increase this dosage without increasing the frequency of administration. In children ½ tablet (0.125 G for each 20 lb. of bodyweight) on the first day followed by half this dosage daily is suggested.

Packaging: Tablets of 0.5 G in containers of 12, 100 and 250.

Parke, Davis & COMPANY, LIMITED (Inc. U.S.A.) HOUNSLOW, MIDDLESEX Tel: HOUnslow 2361

P.D. 658

NOW — a favourite prescription

in a NEW form . . .

more convenient for both patient and doctor

You can now prescribe

Bellergal Retard

1 tablet night and morning

for **continuous** control

of symptoms in a wide variety

of psychosomatic disorders

Bellergal Retard

BY **SANDOZ**

TABLETS

0.2 mg. total alkaloids of belladonna
0.6 mg. Ergotamine Tartrate B.P.
40 mg. Phenobarbitone B.P.

Sandoz Products Limited

Sandoz House
23 Great Castle Street
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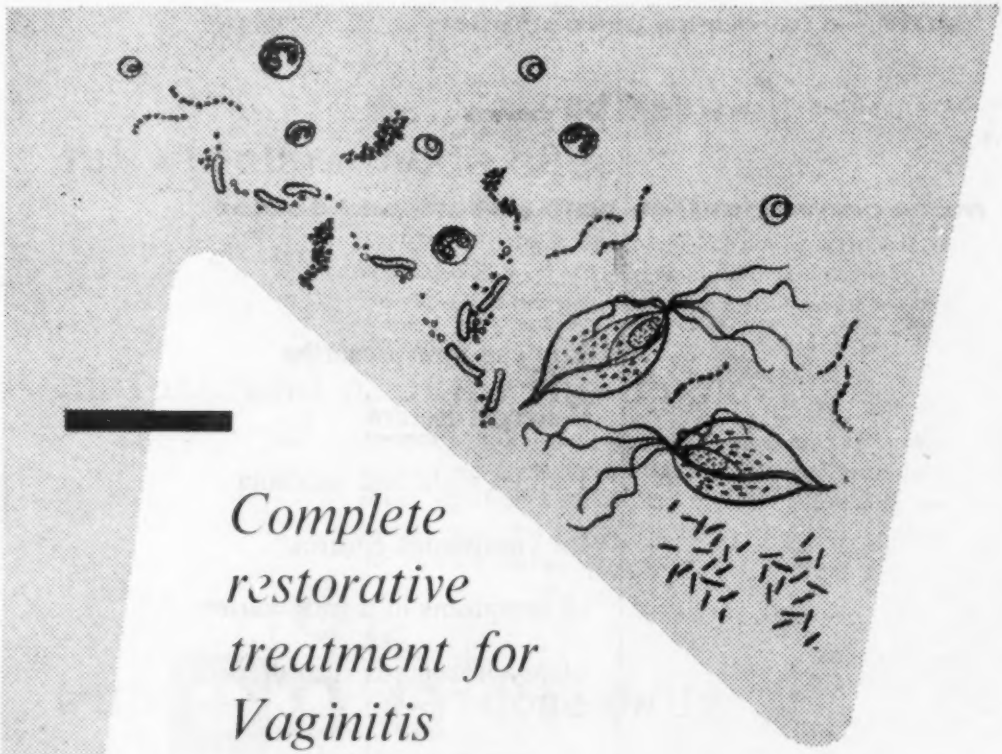


Complete restorative treatment for Vaginitis

Floraquin

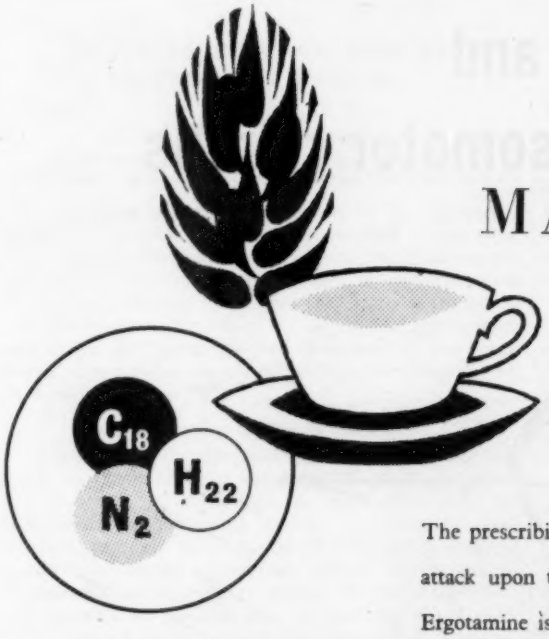
BRAND OF
DI-IODOHYDROXYQUINOLINE
COMPOUND

By combining 'Diodoquin' with lactose, dextrose and boric acid, FLORAQUIN effectively eliminates trichomonal and mycotic infections, suppresses non-specific pathogens and restores normal vaginal acidity, epithelial structure and glycogen content favourable to the growth of protective Döderlein bacilli.

Available as tablets in boxes of 25 and 50 with applicator and 400 with 8 applicators, and as powder in 1 oz. bottles.

Literature on request.

SEARLE HIGH WYCOMBE, BUCKS.



today's new MASTER PLAN *against migraine*

Each tablet contains
ergotamine tartrate 2 *mgm.;*
caffeine (alkaloid) 100 *mgm.;*
cyclizine hydrochloride 50 *mgm.*
In bottles of 10 *and* 100

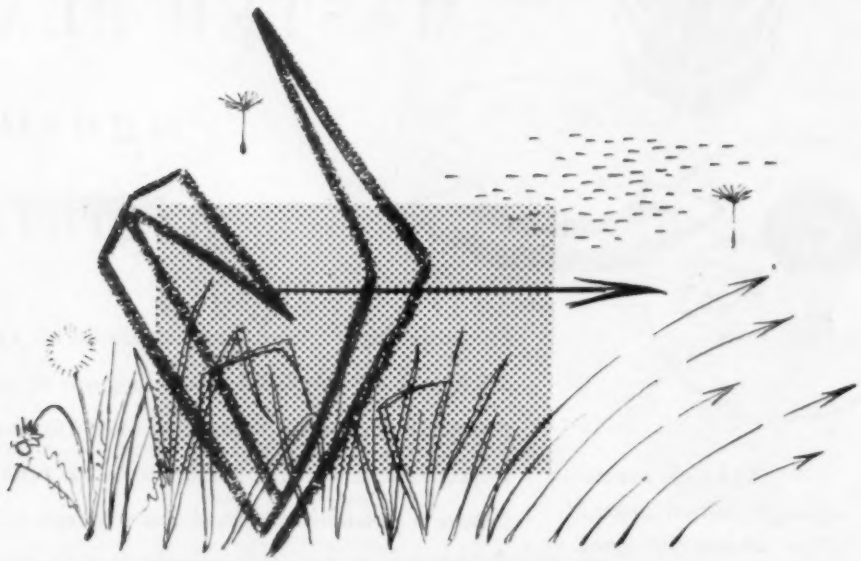
The prescribing of 'Migril' makes possible at last a *planned* attack upon the three predominant symptoms of migraine. Ergotamine is present at strength in 'Migril' for its specific effect upon the characteristic headache and ocular disturbances. Caffeine is present too, since it acts as a synergist to ergotamine. Frequently, however, ergotamine tends to evoke nausea and vomiting on its own account and can therefore worsen these aspects of the condition. For this reason, the potent, rapidly acting anti-emetic cyclizine is also included in 'Migril'—to overcome any tendency to nausea or vomiting, whether caused by the ergotamine or by the condition itself. And so successfully does cyclizine achieve this aim that truly effective oral doses of ergotamine can today be given—by means of 'Migril'.

'migril' TRADE MARK

BURROUGHS WELLCOME & CO., LONDON
(THE WELLCOME FOUNDATION LTD.)

33

In hay fever and perennial vasomotor rhinitis



PIRITON

- is highly effective with a very small dosage
- relieves symptoms in 10 to 30 minutes
- does not cause drowsiness
- is virtually without side-effects even after prolonged use
- is suitable for administration to children
- is available in a complete range of dosage forms

For initial, supplementary or routine therapy
PIRITON TABLETS
Each tablet contains 4 mg. Piriton (chlorpheniramine) maleate. Bottles of 25 and 500 tablets.

For sustained relief
PIRITON DUOLETS
Each Duolet contains 8 mg. Piriton (Chlorpheniramine) maleate; 4 mg. in the outer shell for immediate action and 4 mg. in the specially-coated inner-core, for delayed action. Bottles of 25 and 250 Duolets.

For emergencies
PIRITON INJECTION
Contains 10 mg. Piriton (Chlorpheniramine) maleate in 1 c.c. Boxes of 5 & 100 ampoules of 1 c.c.

STANDARD REFERENCE CARD ON APPLICATION

Manufactured in England by ALLEN & HANBURYS LTD LONDON E2
N58/106/H

ENVIRONMENTAL FACTORS IN RESPIRATORY DISEASE *

D. D. REID
M.D. Aberd., Ph.D. Lond.
READER IN EPIDEMIOLOGY AND VITAL STATISTICS,
LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, LONDON, W.C.1

IN the study of respiratory disease in its community setting, I have followed Milroy's precepts "that more diligent and continued attention may be paid than has yet been attempted in this country to the study of the accurate *Geography of Diseases*" and that this must be combined with *Chronology*—the exact timing of the appearance, persistence, and aggravation of disease—"so that some record of its varying natural history may be preserved for the benefit of future times".

Respiratory Illness in Offices

Experience in the epidemiology of tuberculosis has taught us the hazards of the widening circle of human contacts which the child meets on leaving the sheltered environment of home and school. It seems sensible, therefore, to apply the methods of collaborative inquiry already used in the schoolroom surveys to investigate environment and respiratory disease in offices where so many spend their working life. Accordingly Dr. Robert Williams and I set up a small pilot inquiry, designed to exploit bacteriological and clinical methods of studying the occurrence and spread of common colds in London offices of the General Post Office (Reid, Williams, and Hirch 1953).

During an epidemic season, histories of all respiratory affections were elicited by regular weekly inquiry from the staffs working in these offices. At the same time, samples of the office air were taken by the slit-sampler method. The resulting count both of general bacterial air contaminants and of *Strep. salivarius*, which is used as an indicator of air pollution by organisms ejected from the mouth, were plotted against the incidence curve of colds among the office staff. Observations of outdoor temperature and indoor humidity were made and charted in the same way.

The time sequence of events thus observed was clear enough. The sudden autumnal fall in outside temperature coincided with a shutting of windows to maintain a stable indoor temperature. The *Strep. salivarius* count rose in step with a sharp increase in the incidence of colds. This in turn coincided with the outbreak of an epidemic of colds in other members of the G.P.O. staff in the rest of London; and it was followed, about two weeks later, by a rise in the notification-rate of acute pneumonia in the the general population of London.

The epidemic conundrum is—does the sudden change in climate precipitate an epidemic of colds and their major sequelæ by prompting the shutting of windows and increasing the pollution of the air by organisms from the throats of the occupants so that colds spread more readily from one to another? Or, if we discount the possibility of virus mutation, does the change, perhaps in temperature or humidity, alter host resistance to minimal infections and multiply the frequency of clinically apparent disease?

The problem of the epidemic effects of temperature change has been discussed by writers back to Hippocrates; but it has been more recently studied in the present context of London by workers such as Young (1924), Woods (1928), and the Payling Wrights (1945). The Payling Wrights showed very clearly that the weekly mortality-rate from bronchopneumonia in children under 2 years of age was highly correlated with a fall in the temperature two weeks before. They inclined to the view that the climatic change upset the epidemic balance more by lowering resistance than by increasing the ease of spread. Our recent work supports that proposition.

In the family studies, for example, colds were rather more common among the less adequately clad children. Again, a seasonal increase in the secondary-attack rates within households, based on clinically obvious infections, was not paralleled by any contemporary increase in the apparent rate of passage of the indicator organisms from person to person. Yet some such increase might have been expected to result from an increased rate of transmission of infection. In the schools the incidence of colds was lower in classrooms which were usually kept at higher temperatures. Although, in offices, the higher *Strep. salivarius* content of the air certainly suggested that the conditions of poorer ventilation in cold weather might favour aerial transmission of disease, the whole drift of the evidence appears to minimise the importance of this means of spread in the common cold. Carefully controlled observations on the immediate past history of those with acute coryza were consistent with the popular belief that being exposed to chilling was significantly related to the onset of clinically obvious infection. In short, it seems likely that the sudden climatic change at the approach of winter precipitates apparent disease among the carriers of an infection which then spreads rapidly by close-range droplet spray or intimate contact through a population made susceptible both by the sudden cold and the low endemic level of infection during the summer.

Climatic Change and Air Pollution

Whatever its origin, this seasonal wave of minor respiratory infections is but the forerunner of much more serious respiratory illness, which is certainly related in time to the seasonal changes in temperature and other associated aspects of climate. When, however, to the more usual changes in climate are added the sudden temperature inversion and humidity of fog, the whole pattern of morbidity and mortality can alter dramatically. The smog disaster of 1952 is the most recent and alarming example, but the medical statisticians at the General Register Office from Farr to Logan (1953) have reported fogs in London which have been associated with excesses in mortality ranging from a few hundreds to four thousand.

Reviewing the experience of the years 1870–91, Russell (1926) concluded that the sudden rise in the respiratory-disease death-rate noted in the fogs of that period were more likely to be due to the drop in temperature which always accompanied these fogs than to any other environmental characteristic. But when the temperature falls, other changes in habit and environment occur: for instance, fires are stoked up and there is an increase in the atmospheric pollution. The peak of mortality during the London fog of 1952 was much more closely associated

* The second Milroy lecture for 1957, delivered before the Royal College of Physicians of London on Feb. 7, 1957. The first lecture appeared last week.

with a rapid increase in air pollution, measured by the sulphur-dioxide content of the air, than with contemporary changes in temperature or humidity (Wilkins 1954).

The critical question seems to be whether these outbreaks of respiratory mortality are the morbid results of the climatic changes alone, or whether pollution has added much to the lethal effects of the physical changes in the atmosphere. In other words, is atmospheric pollution the modern equivalent of the *tertium quid* of the epidemiologists before Pasteur—something added to the epidemic situation between individuals and their climatic environment which produces respiratory illness? And if it is, is its effect purely immediate and transient precipitating acute illness or death in men already crippled by respiratory disease? Or does pollution have more chronic insidious effects in those exposed to it?

It should be confessed at once that these questions cannot yet be answered. Correlations in time between factors so closely linked as temperature inversion and smoke pollution allow little discrimination between their separate effects. But the primary role of epidemiology in the problems of medicine is reconnaissance rather than final resolution. And to effect this, one must turn from chronology to a study of the geography of respiratory disease.

Geographic Distribution of Respiratory Mortality

In his *Observations*, published in 1750, Short remarks about London that it is " more unhealthy (especially to Children and new Comers) from the Smoaks, Stinks, and close Air "; and elsewhere that " a very moist cold temperature of the Air certainly produces Heaviness, Coughs and other Disorders ". It seems fitting that we in the London of today should try to bring Short up to date.

The traditional approach to an epidemiological problem is by the analysis of mortality data. In London the geographic pattern of respiratory mortality is certainly clear-cut; the death-rate from chronic bronchitis, for example, is more than twice as high in the districts to the north and east of the centre of the City than in other areas such as Hampstead; and Hewitt (1956) has given reasons for thinking that these disparities are due to atmospheric rather than social differences. In the country as a whole, the areas of excessive chronic bronchitis mortality have been shown in studies by Pemberton and Goldberg (1954) and Daly (1954) to be those where indices of air pollution are highest. These workers do not claim, however, that this is conclusive evidence of cause and effect. Death is the terminal event in a chain of circumstances which may each be affected by urban conditions other than atmospheric pollution. Thus the multiple contacts of city life may increase the frequency of the minor infections. The worst-affected districts of our great towns may be the most heavily plagued by smoke; but they are equally the most congested areas, where men, whose jobs may subject them to industrial dusts, physical exhaustion, and climatic exposure, often live in overcrowded and inadequate homes. Although our family studies rather suggest that some of these circumstances may be less important in respiratory infection than had been thought, other social factors such as diet or medical care and duration of convalescence may alter the case-fatality rate of those infections if not their frequency. Mortality-rates may not, therefore, reflect the unalloyed results of the single factor of air pollution, and geographical differences in death-rates should be interpreted with caution.

Use of a Standard Occupational Group

An alternative gambit is afforded by the work of the Treasury Medical Service in supervising the health of Civil Servants of all kinds. In the General Post Office, for example, postmen are uniformly selected, do much the same job at standard rates of pay, and, once established, form a relatively stable occupational group spending much of their working lives in the same district. The cause and timing of all their sickness absences are meticulously recorded; and, should their working lives be cut short by serious disability, the medical standards for retirement on health grounds are continually under the scrutiny of the Treasury Medical Service staff.

A review of wastage-rates among postmen due to premature retirement or death because of bronchitis and pneumonia showed a concentration in the great towns and industrial areas of the country. There was no gradual increase from South to North such as one might expect if climate in general or temperature in particular were the dominating factors in morbidity. Economic and occupational differences cannot explain this geographical pattern of morbidity. Other factors to which postmen are exposed as citizens of the great industrial cities must therefore be the determinants of respiratory sickness; and the experience of this standard occupational group may give suggestive clues about their nature and numerical importance.

We might consider, for example, that postmen on their rounds in the different parts of London are reasonably equal in all other material respects. If so, we can use their sickness experience as an index, free from the influence of social background and occupation, of the effect of local environment on respiratory disease. A Meteorological Office publication (Marshall 1952)—*A Century of London Weather*—assures us that there is little difference in temperature and humidity between places within the London area such as Kew, Kingsway, Croydon, and Greenwich; if anything it is warmer in the centre of London. Yet the invaliding-rates from chronic bronchitis for London postmen rise steadily from south-west to north-east presenting the same concentration as the male mortality from bronchitis—and, incidentally, from cancer of the lung (Reid 1956, Stocks 1952). Wilkins (1954) reports that this concentration also coincides with the build-up of smoke in the Greater London area by the prevailing west-south-west wind.

Thus encouraged, Dr. Anthony Fairbairn and I (Fairbairn and Reid 1958) have tried, with the support of Dr. W. E. Chiesman and his colleagues at the Treasury, to exploit the information on sickness among Civil Servants collected either routinely or by special sample surveys. We hoped that the use of this standard population would control at least some of the variables involved without restricting unduly the relevance of our findings in these particular groups to the generality of the population.

Local Levels of Presumptive Air Pollution and Bronchitis

Before the 1939–45 war, Durst (1940) organised a survey of atmospheric conditions at observation points scattered widely over the country. Night and morning, observers noted the range of clear vision and classified conditions in their area according to the frequency and density of mist and fog. Analysis showed that areas are quite consistent in their relative fogginess from one year to another. Moreover, visibility indices of this type can be shown to be correlated with measures of pollution such

as the sulphur-dioxide content of the air and indirect measures such as the index developed by Daly (1954) for county boroughs on the basis of coal consumption per acre of inhabited area.

The country can be divided into groups of areas where the postman's environment at work is fairly homogeneous —e.g., the towns and villages of East Anglia, Scotland outside Glasgow, or the industrial conurbation round Manchester. Wastage-rates due to premature retirement or death because of bronchitis and pneumonia were worked out on the basis of routine reports on such cases among the postmen working in thirty-seven such areas in the United Kingdom. A sample survey of sickness absence by cause allowed us to compute rates due to all forms of respiratory and other disease among these postmen and indoor workers of each sex in the same areas. From the information given in the Registrar-General's reports we calculated death-rates from bronchitis, pneumonia, pulmonary tuberculosis, and cancer of the lung among men and women aged 45–64 in the general population of the same thirty-seven areas. At the same time we collected data on other indices of local environment—population density and domestic overcrowding—likely to be relevant to the incidence of respiratory disease. All these observations related to periods round the 1951 Census.

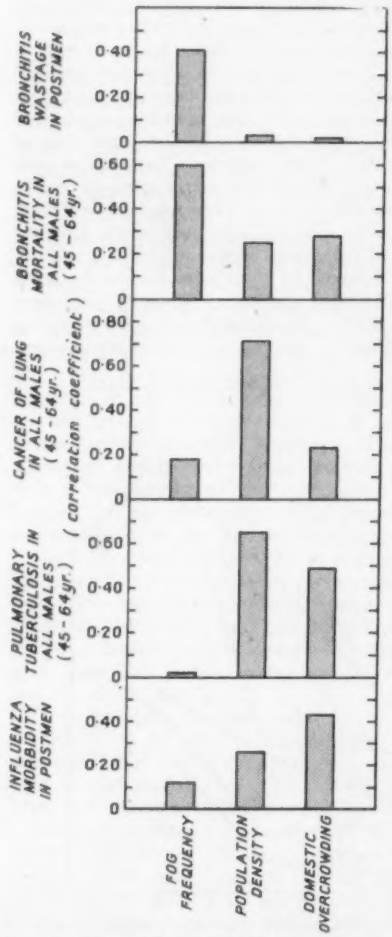


Fig 5—Net correlation of respiratory disease experience and local environmental indices.

An analysis of the interrelations of some of these rates of respiratory sickness or death with the indices of local environment gave the results shown in fig. 5. The wastage-rates due to postmen dying or retiring prematurely because of bronchitis are uniquely and quite closely related to the frequency of thick and presumably polluted fog, but not to population density or domestic overcrowding, in the same area. An important feature of these results is the consistency between this pattern among men of the same occupational group throughout the country, and the behaviour of bronchitic mortality in middle-aged men in the population as a whole. Again, the death-rates in the general population from cancer of lung, and to some extent from pulmonary tuberculosis, are related not to fog frequency but to population density. This conformity in pattern between lung cancer and phthisis may be an expression of urban/rural differences in cigarette smoking, which has been shown to be associated with death from both these diseases (Doll 1953, Lowe 1956). On the other hand, both pulmonary-tuberculosis mortality in the general population and influenza morbidity among postmen rise in step with the degree of domestic overcrowding in the areas, presumably as a result of increased opportunities for cross-infection in both these diseases. If this interpretation of these correlations is correct, it would seem that the regional distribution of bronchitis morbidity and mortality is more readily explained by local differences in fog frequency than by factors such as smoking habits or cross-infection which affect the incidence of lung cancer or pulmonary tuberculosis and other respiratory infections such as influenza.

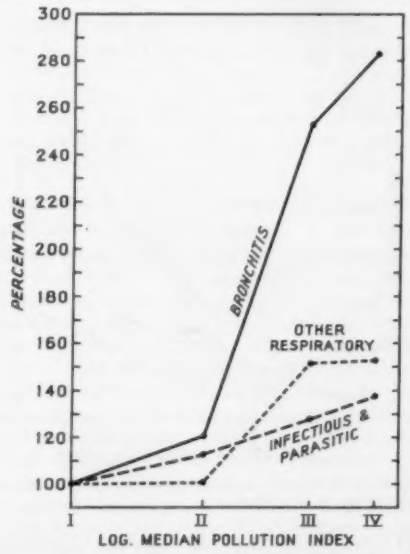


Fig. 6—Absence-rates among postmen working in areas with different air-pollution levels.

It seems reasonable, therefore, to regard the frequency of fog thick enough to restrict visibility to less than 1100 yards as a practical index of those atmospheric conditions which are related to high bronchitis sickness and death rates. But it would be less reasonable to assume that the relation was either simple or direct, for the gradient noted is largely one between small towns and major industrial cities, whose sickness experience may differ for other reasons than atmospheric pollution and in other ways than in the toll of chronic bronchitis.

A more detailed analysis of the sickness experience of postmen working in different areas can give some evidence on these points. The thirty-seven areas can be divided into groups, equal in the size of their postman population, but ranged in increasing steps of the fog index. The crude attack-rates among postmen in those groupings during the years 1946–53 inclusive for some major diagnostic cate-

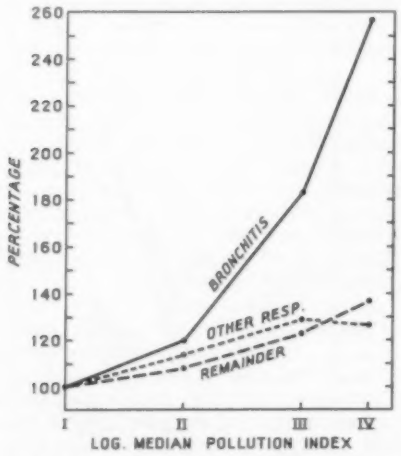


Fig. 7—Ratios of absence-rates for postmen and clerks according to local levels of air pollution.

gories are set out in fig. 6. The gradient between the fog group rates (expressed as ratios to the basic level in the least foggy areas) is much more distinct for bronchitis than for all other respiratory diseases.

Although there is a rise in the incidence of the group of specific infectious and parasitic diseases, it is hardly great enough to suggest that a generally increased opportunity for infection in the larger towns fully explains the high bronchitis-rates there. There is also some reason to believe that lower morale in the larger post offices may be reflected in higher sickness-rates; but there seems to be no very good reason why chronic bronchitis should be consistently singled out as the excuse for unwarranted absence only in the fog-ridden areas.

The most convincing evidence that the excessive chronic-bronchitis rate in the industrial centres is not an illusory reflection of morale but a substantial physical phenomenon comes from a comparison of the experience of postmen and clerks or of postmen of different ages working in the various regions of the country. Because of the differing physical demands of their jobs, the same degree of disability due to sickness or injury must inevitably incapacitate the postman more than the clerk. Even if the incidence of chronic bronchitis were exactly the same in these two occupational groups, some difference in the frequency of absence from work for that cause would be expected. On the other hand, both groups face the infective risk and psychological background common to all inhabitants of the same area. If, then, regional variations in air pollution played no part in the onset of bronchitis, this relative disparity between the attack-rates among postmen working largely out of doors and clerks working inside should be the same all over the country. When, however, the absence-rates attributed to chronic bronchitis for postmen are compared as a ratio to those of clerks in each of the four pollution groups in turn (fig. 7), it becomes quite clear that the gap between the rates widens with each increase in the index of pollution. There is no such steep gradient either for other respiratory diseases or for all the remaining causes of absence. In short, the increasing frequency of smog is associated with relatively more frequent attacks of bronchitis among the postmen, who are more exposed by their active outside job to that polluted atmosphere, than among the sheltered indoor clerks.

What may be the cumulative effects of differences in exposure to polluted atmosphere also appears in the age-specific attack-rates of chronic bronchitis among postmen of the same age but working in the four pollution groups of areas. Beginning as early as the age-group 25–34, the gap between the age-specific rates widens increasingly with age. Atmospheric pollution may thus have some initiating or persistently aggravating effect on chronic bronchitis quite apart from its action on the cardiac or respiratory cripple in the acute smog episode. In New Zealand Eastcott (1956) showed that immigrants from this country who had lived here for the first thirty years of life had higher death-rates from cancer of the lung than the New Zealand born population of British stock; and the increasing gap in bronchitic incidence here observed may be another result of prolonged exposure to British conditions—among them the atmosphere of British towns.

Evolution of Chronic Bronchitis

Up to this point I have taken cross-sectional snapshots of the sickness experience of men of different ages during a relatively short period. Chronic bronchitis, however, is a disease whose often slow progress must be studied as it develops over the life-time of the individual. Longitudinal records of this kind covering the whole of life are seldom, if ever, available; but in the Post Office each man's detailed sickness history over his entire service is kept in his personal file. Thus it was possible to compare the sickness experience of postmen who had been invalided from the postal service because of chronic bronchitis or who had died prematurely because of that disease with that of matched " controls ". These " controls " were other postmen, randomly selected from those of the same age, working from the same office, but without completely disabling respiratory disease. The intention was to see how the natural history of respiratory illness during adult life of men ultimately disabled by bronchitis differed from the frequency and nature of respiratory illness of other men, not so disabled, working in the same environment. At the same time, it should be possible to contrast the develop-

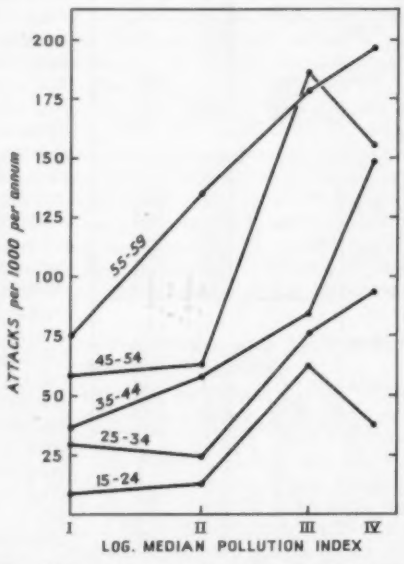


Fig. 8—Bronchitis absence-rates at different ages for postmen in areas with different air-pollution levels.

ment and character of the disabling disease labelled as " chronic bronchitis " in postmen working in areas of differing degrees of pollution.

A comparison of the frequency and severity of attacks of bronchitis during the working lives of bronchitic invalids and their matched controls showed that, even in early adult life, those destined to become disabled by chronic bronchitis have more and longer absences from this cause than other men of the same age (Reid and Fairbairn 1958). The same general trend is equally apparent in the frequency of absence due to colds and other upper respiratory infections, and there is evidence among these bronchitic invalids of a minority who manifest an unusual susceptibility to respiratory infection at least twenty years before they die or have to stop work (usually in their middle fifties). If this long-term predisposition to respiratory illness extends back, as seems likely, to earlier childhood, then in chronic bronchitis, as in so much else, the child is father to the man.

Regional Variations in Natural History

Age-trends in both sickness-absence and death-rates from chronic bronchitis agree in emphasising the rapid deterioration which sets in after the age of 45; and fig. 8 suggests that the speed of disease evolution may be related to local levels in presumptive air pollution. A more detailed comparison of the frequency, duration, and complications of attacks of respiratory illness among these bronchitic postmen showed that, after 45, men working in the more heavily polluted districts of the country had more frequent absences from work and lost more time over the year than did their colleagues in the less affected areas. Although the overall incidence of minor and major respiratory infections may not be very different, the attack-rate of pneumonia and pleurisy is 30% higher in the critical age group of 45–54 in the more heavily polluted districts.

Reviewing this pattern of respiratory disease makes it seem likely that the exposure to minor infection is not very different in the four groups of areas, but that the cumulative effect of atmospheric pollution transmutes minor infections in later life into major illnesses which appear as serious colds, bronchitis, pleurisy, or pneumonia. Of perhaps greater moment, however, are the disorders of circulation which appear, under various diagnostic labels such as " hypertension " or " myocarditis ", as complications in the downward course of cardiorespiratory disease among these postmen. The serious prognostic significance of these illnesses is evident in the consistent rise in the proportion of men dying in the service while still on sick-leave. This immediate case-fatality rate rises steadily from 3% in the least to 11% in the most heavily polluted areas; and the expectation of life of those who retire on pensions after invaliding is appreciably shorter in these foggy districts of the country.

To recapitulate—we have found that in a stable group of men, doing the same job for the same pay under the same conditions of service, there are wide geographic variations in the incidence of disabling respiratory disease. These variations cannot be explained by social, economic, or occupational factors or by any consistent difference in climate other than fog. Not only do more postmen become disabled by chronic bronchitis in areas where thick and presumably polluted fog is more frequent, but the character and natural history of the disease in these areas reflects variation in atmospheric pollution. In the most heavily polluted areas of the country—mainly the industrial cities—minor infections among younger bronchitics do not appear to be much more frequent than elsewhere. But among the older bronchitic postmen in polluted areas, these minor infections lead to more frequence absence from work and seem more often to lead on to complications such as pleurisy, pneumonia, and circulatory failure which hasten death.

Smoking Habit as a Complicating Factor

One of the most striking features of mortality from chronic bronchitis in this country is the pronounced male excess in middle life. This excess might be attributed to the occupational circumstances of men's lives, which may expose them to the weather, to hard physical exertion, or to many sources of infection. Again, these differences apparent in mortality may reflect differences in case-fatality rate rather than in disease incidence. In the Civil Service, however, we have men and women working side by side in the same offices doing the same job and exposed, at least through their working hours, to the same environmental conditions. Comparison of attack-rates calculated for men and women indoor office workers in different age-groups but all exposed to the fairly uniform climate of London showed that the excessive mortality of the male is paralleled by an increased morbidity-rate in middle life which cannot be explained by differences in occupation between the sexes (Reid 1956); and Higgins (1957) has reported a similar male excess in the prevalence of bronchitic symptoms in a country district.

The differing clinical responses of fathers and mothers to infection noted in the Paddington survey (Brimblecombe et al. 1958) certainly suggested that in early adult life the female is more susceptible to respiratory infection than the male. The opposite could conceivably hold in later life; but, as Oswald and Medvei (1955) have shown in the same occupational group of Civil Service clerks, the sex disparity is more likely to be explained in part by differences in smoking habits. In the longitudinal study already described, there was evidence in the sickness records and death certificates of men followed up for some years of an excessive incidence of peptic ulcer, cancer of the lung, and coronary thrombosis—all conditions already linked by numerous studies with cigarette smoking. When taken together with the more direct evidence produced by Doll and Hill (1956) on the consistent upward trend with increased cigarette consumption among doctors in mortality from chronic bronchitis, these results must increase suspicions about the aggravating effect of cigarette smoking in chronic bronchitis and the importance of differences in smoking habits as a source of local variation in mortality from this disease.

Prospect for Research

Arnott (1954), speaking as a clinician, has generously referred to the extension of the epidemiological approach beyond the infectious fevers as " the most exciting feature of current medical science ". I should like to believe that this was so, but I must admit to the charge that epidemiological studies are apt to raise more questions than they answer. The pilot work I have described establishes no more than a prima-facie case for further study of the undoubted association between sickness and death from chronic bronchitis and the frequency of dense and presumably polluted fog in the same area. It would be premature to revive the penalty imposed on a citizen of Southwark in the year 1370 who was indicted for " causing a filthy and fulginous vapour by burning raw coal ". (He was

hanged.) On the other hand, the human and economic consequences of neglect of the environment in the problem of chronic bronchitis are such that any lead, however tenuous, must be followed up.

Measurement and comparison are at the basis of epidemiology; and improved nosography is the first step in that splitting of the problem into manageable parts which is essential to its solution. Vital statistics deal with chronic bronchitis as a single clinical entity; yet the bronchitis of the young female in a country district may be an allergic response quite different from the infective, rapidly progessive, and disabling disease of the older male in the polluted and congested city. The evidence from the study of the invalid postmen certainly suggests that one or more factors in urban environment or habits do twist the clinical pattern into something different and more lethal. The classification of respiratory disorders and the standardisation of diagnostic criteria are clearly first needs for any intelligent comparison of experience in different countries and even in different parts of the same town.

If we discount the uncontrollable elements of our island climate such as sudden changes of temperature and humidity, we must still identify the hazardous element in the polluted fog of industrial cities. If the operation of the Clean Air Act succeeds in removing the solid content of city smoke, will any remaining sulphurous and other gaseous elements continue the erosion of the bronchi of the next generation? Perhaps we must wait, but we should also watch.

Although the enhanced risks of infection in the crowded towns cannot explain more than part of the excessive morbidity and mortality from chronic bronchitis, pollution may aggravate infection to produce a much more complex and crippling disease. The analogy of the coaction of dust and tuberculous infection in progressive massive fibrosis in miners is apposite; and the methods of field study which are proving so profitable in that condition should be employed in a much wider study of the nature of chest disease following different exposures to atmospheric pollutants.

Air pollution produced by burning raw coal is not, however, the only external factor likely to be involved in chronic bronchitis. Quite apart from the specific occupational hazards, which I have not discussed, differences in personal smoking habits may explain some of the disparity between town and country and more of the difference between the middle-aged male and female. We thus need precise sample surveys of the smoking habits of men and women doing the same job in town and country to see whether, for example, the prevalence of chronic bronchitis is the same in men and women non-smokers living in the same environment. Again, cigarette smokers in the fog-ridden towns may have the unduly high bronchitis-rates which some cumulative synergism of personal and atmospheric smoke pollution might produce. This is the sort of question which can be answered only by surveys and long-term follow-up.

In presenting this catalogue of uncertainties, I am quite unabashed by the dismissal of some earnest students of geology by Sir Joseph Banks, the one-time despotic president of the Royal Society. They asked his leave to circulate a series of questions of moment. His curt response was that a few fools could ask more questions in half an hour than wise men might answer in years.

On the contrary, I prefer to draw courage from Sir William Gull's advice to the British Medical Association on the conduct of collective investigations. "Nature is very much a Sphinx," he said, "and will answer no question put to her if it be open to evasion." He counselled the committee to put "a definite question, and, that being settled, follow it up by another, and so on in series. Nature must at last be driven into a corner and be obliged to say 'Yes' or 'No'." That seems to me to be the only course open to us through the maze of chronic respiratory disease; for I am at one with Gull in believing that a question well posed is already half answered.

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HÆMOPHILIA-LIKE STATES IN GIRLS *

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THE possibility that a female hæmophilic offspring might result when an ovum carrying the recessive hæmophilic gene in the X chromosome is fertilised by a sperm also containing the defective gene in its X chromosome was pointed out by Piney (1927). No authentic case, however, was found in the extensive and numerous pedigrees collected by Bulloch and Fildes (1911), Birch (1937), and others.

When Hutt et al. (1948) discovered in a dog a bleeding condition which appeared identical with the human disease, it became possible to test experimentally whether hæmophilia could be produced in the female. An affirmative answer was obtained by Graham et al. (1949) when they produced female hæmophilic pups by mating a carrier bitch with a hæmophilic male. The human counterpart, a female bleeder having a carrier mother and a hæmophilic father, was reported by Israëls et al. (1951); their patient exhibited the clinical history and the laboratory findings of hæmophilia.

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The recent discovery of several types of hæmophilia-like states necessitates reassessment of classical hæmophilia and its related states in women. The opportunity of having available for repeated studies several girls with bleeding conditions closely resembling hæmophilia made it possible to obtain additional pertinent information and to permit correlation with published cases.

Laboratory Procedures

The details of the procedures used have been described recently (Quick 1957a). Only a few comments, therefore, on the techniques and interpretation will be given here. Blood collected with a silicone-coated syringe and needle was transferred to test-tubes similarly coated. The tubes were immersed in an ice-bath. All clotting-tests were made in glass test-tubes (13 mm. × 100 mm.) at 37°C.

Whole-blood clotting-time.—This test was made, whenever possible, immediately after the blood was collected, because storage of blood in silicone-coated tubes shortens the clotting-time. The normal range is 5-10 minutes.

Prothrombin-consumption time.—By allowing blood to clot under standardised conditions and by determining the prothrombin activity of the serum the thromboplastin generated during clotting is indirectly measured. Since the test is empirical, meticulous standardisation is essential.

The test-tube containing 1 ml. of blood was put in a water-bath at 37°C. Exactly 15 minutes after a solid clot had formed the tube was centrifuged and reincubated at 37°C for 45 minutes more. The prothrombin time of the serum was determined by blowing 0·1 ml. into a mixture of 0·1 ml. of rabbit-brain thromboplastin, 0·1 ml. of 0·02*M* $CaCl_2$, and 0·1 ml. of deprothrombinised oxalated rabbit-plasma, and accurately timing the clotting. Since serum lacks fibrinogen and labile factor (factor v), these have to be supplied; rabbit-plasma adsorbed with $Ca_3(PO_4)_2$ is a satisfactory source of both. Neither deprothrombinised human plasma nor fibrinogen solution is satisfactory, because they do not supply sufficient labile factor. When the consumption of prothrombin is very low, as in the clotting of blood from a patient with severe hæmophilia or of platelet-depleted plasma, the prothrombin time of the serum is 8 or 9 seconds.

This procedure has been designated " basic " to distinguish it from the following modified prothrombin-consumption time tests which measure various thromboplastin precursors more specifically.

Thromboplastinogen-activity time.—When rabbit-brain extract is heated to 60°C it loses its holothromboplastic potency—i.e., it no longer brings about consumption of prothrombin when added to hæmophilic blood (Quick et al. 1952). It retains, however, an activity which is similar to that of platelets: it causes consumption of prothrombin in normal plasma depleted of platelets but not in hæmophilic plasma. A low consumption of prothrombin with this test is observed in both hæmophilias, A and B, but a normal result is obtained in thrombocytopenic purpura and thrombasthenia (Quick 1957b). In making the test 0·025 ml. of the rabbit-brain extract heated to 60°C is added to 1·0 ml. of blood. Except for this step, the procedure is the same as in the basic test.

Hæmolysate test.—An extract of human erythrocytes has an activity similar to but not identical with that of platelets (Quick et al. 1954b). Added to normal platelet-poor plasma it causes a significantly greater consumption of prothrombin than does an extract of platelets. Mixed with plasma from a patient with severe hæmophilia it causes no detectable consumption of prothrombin, shown by the minimal serum-prothrombin time of 8 or 9 seconds. The addition of minute amounts of a purified preparation of thromboplastinogen or of normal plasma to hæmophilic blood brings about a relatively high consumption of prothrombin. By this test the effect of adding 1 part of normal plasma to 1000 parts of hæmophilic plasma can be measured quantitatively (Quick 1957c).

Consumption of prothrombin with added aged normal serum.—The addition of 0·1 ml. of aged normal serum to 1 ml. of hæmophilic blood before clotting causes no improvement in the consumption of prothrombin. On the contrary, when aged serum is added to blood from a patient with hæmophilia B, the consumption of prothrombin is strikingly increased (Quick 1957c).

Thromboplastin-generation test.—The method of Biggs and Douglas (1953) was used, but modified by using a platelet substitute made according to the method of Bell and Alton (1954). In recording the results the shortest clotting-time was selected. The normal range is usually 7–12 seconds.

Preparation of thromboplastinogen.—The method described by Quick et al. (1954a) was used. It consists in removing platelets by rapid centrifugation, then adsorbing prothrombin, stable factor, and PTC (Christmas factor) with $Ca_3(PO_4)_2$, and precipitating the active principle by dilution with ice-cold distilled water and saturation with CO_2. The product obtained is highly potent and free from the other known clotting factors, except for traces of labile factor and fibrinogen. The agent has been named thromboplastinogen (Quick 1947) in preference to antihæmophilic globulin, the term originally applied to a plasma factor whose activity was postulated to be independent of platelets (Lozner et al. 1942). It was pointed out that the factor could also be named prothromboplastin, but that thromboplastinogen was " more euphonious ".

Case-reports

Case 1.—A girl born on Sept. 29, 1947, was noted to bruise easily in early infancy, but her first serious bleeding occurred at the age of 18 months, when she cut the frenum of her upper lip. At 3 years she had a large hæmatoma on the medial aspect of her left thigh and a swollen knee. She required several transfusions but was in hospital only six days. Dr. M. H. Poindexter, Jr., of Fargo, North Dakota, diagnosed hæmophilia on the basis of a normal prothrombin time and a prolonged clotting-time.

These findings were confirmed in August, 1953, when, in addition, a very poor consumption of prothrombin was found. No correction was observed when the patient's blood was mixed with that of a known hæmophiliac. Physical examination was normal except for old ecchymotic spots, a hæmatoma on her right elbow, and swelling of the sole of her right foot.

On her second visit, in May, 1954, the laboratory results were the same as before, and the only findings on physical examination were the characteristic small hæmatomas and bruises. The patient was not seen again until July, 1956. Between her second and third visits she had swelling of her left popliteal area, a wrist, and an ankle. The last named prevented her for several days from walking. In August, 1954, she had seven teeth extracted. Although she was given one transfusion before and one after the extractions, bleeding began on the fourth day and required six transfusions to control. She has not had any transfusions since this episode but has had intramuscular bleeding into a thigh, and in November, 1957, an entire arm became swollen after an injury to the elbow.

She was last seen in January, 1958, when her blood was extensively studied, and the same tests were run simultaneously on the blood of a patient known to have severe hæmophilia. No deformity, enlargement, or limitation of movement of any joint was found ; but, when her right knee was flexed, a sharp click was constantly heard. True hæmarthrosis was not shown on radiography. Most of the severe bleeding was intramuscular; there was neither epistaxis nor hæmaturia.

The family history is entirely negative. The mother has no tendency to bleed; two brothers and one sister are normal. Neither her father nor her mother knows of any bleeding in their families. The patient's father, likewise, is entirely normal, and he has three brothers who have no tendency to bleed. Especially significant, the patient has a brother three years younger who is entirely normal.

The laboratory studies are summarised in tables I–III.

Case 2.—This girl was born on June 16, 1949. Since her early history has been published previously (Quick and Hussey 1953a), only the salient facts need be given here. Easy bruising was noted at the age of 5 months. At the age of 15 months she had swelling of a knee, and a month later of her buttocks. At the age of 3 years she had swelling in the calf of her left leg, severe enough to prevent her for several days from walking. Later she had pain and swelling of an ankle. She was seen by us for the first time in November, 1951, when she had a hæmatoma on her forehead. The main laboratory findings were normal clotting- and bleeding-times, a slightly prolonged prothrombin-time (16 seconds), and a very defective prothrombin-consumption time. On mixing her blood with that of a patient known to have severe hæmophilia no correction was observed with the prothrombin-consumption test.

TABLE I—LABORATORY FINDINGS IN CASE 1 AND FAMILY

Test	Case 1	Brother	Father	Mother	Known hæmophiliac	Normal control
Clotting-time (min.) ..	51	9	8	8½	45	8
Prothrombin-consumption time (sec.):						
Basic	8	28	26	24	8	32
With T.A.T.* reagent	9	26	38	35	8	32
With hæmolysate ..	8	51	85	92	8	93
With aged serum ..	8	25	28	22	8	26
Thromboplastin-generation test (sec.):						
Subject's plasma ..	47	9	9	8	51	7
Subject's serum ..	9	8	7	7	8	7

Studies on patient's brother, father, and mother were made in 1956. Bleeding and prothrombin times were normal in all subjects.
* Thromboplastinogen-activity time.

The second studies were made in September, 1952, when her parents and brother were also studied. Her findings were exactly the same as those obtained a year previously. Significantly, both her father and her mother had a slightly prolonged prothrombin-time—13½ and 13 seconds respectively. At this time mixing her blood with that of a hæmophiliac caused some correction.

The patient was seen again in July, 1956. During the five-year interval she had a few serious episodes of bleeding. She bled for 2½ weeks after the extraction of a tooth. She was given one transfusion, which so far has been the only one received. Easy bruising continued and appeared to be worse after colds. Her ankles occasionally became swollen. She had mild epistaxes for 2 weeks. On physical examination typical ecchymotic spots with a hard central nodule were found. All her joints were normal in size and function.

Her family history is entirely negative. No tendency to bleed was found in either the father's or the mother's family. Two brothers of the patient are well, have never had abnormal bleeding, and have not shown any tendency to hæmorrhage.

TABLE II—EFFECT OF MIXING CASE 1'S BLOOD WITH NORMAL AND WITH HÆMOPHILIC BLOOD

Blood	Clotting-time (min.)	Prothrombin-consumption time (sec.)	
		Basic	With hæmolysate added
Case 1	51	8	8
Known hæmophiliac	45	8	8
Normal control	8	32	93
Case 1+known hæmophiliac* ..	24	8	8
Case 1+normal control	5½	28	77
Known hæmophiliac+normal control	6	22	100

* Equal volumes were mixed.

The results of laboratory studies are shown in tables IV–VI.

Case 3.—This girl was born on Aug. 7, 1947. She bruised easily but had no serious bleeding until the age of 18 months. She was then seen by a physician because of an eye infection. Purpura was diagnosed, probably because of numerous ecchymoses. Without any apparent cause she had a cerebral hæmorrhage. She was in coma and later was paralysed but recovered fairly rapidly. During her early childhood she had numerous bleedings from mucosæ, particularly from the gums, throat, and nose. To control epistaxis she required at times several transfusions. She also had intramuscular bleeding. At the age of 6 years she injured her abdomen and a leg in a fall. An extensive hæmorrhage involving the knee and calf resulted immediately; later she had sharp crampy abdominal pain. After this had subsided she was symptomless for 11 days, when she had gross hæmaturia and epistaxis. At the age of 8 years she had a gastrointestinal infection which caused severe bleeding, both hæmatemesis and melæna; five transfusions were given. The episodes of bleeding have continued but have become somewhat less frequent. Epistaxis and subcutaneous and intramuscular hæmorrhage remain her most common forms of bleeding. During her first 10 years of life she received more than two hundred transfusions. Trivial injuries often caused serious hæmorrhage. Recently she bled into the palm of her hand, causing enough pressure on the ulnar and median nerves to produce serious motor and sensory disturbances. In spite of her difficulties she leads a surprisingly normal life, attends school, and keeps up well with her studies. She has no ankylosis or joint deformities and no abnormal neurological signs.

From the family history it can be deduced that the disease is hereditary. She has a brother two years younger who bleeds like her. Another brother two years older is clinically entirely normal. Neither father nor mother has had abnormal bleeding, and they know of no bleeding in their families.

The patient, her brother who bleeds, and the rest of the family have been studied six times since 1953. The results of various tests have remained fairly constant, except the thromboplastin-generation test, which varies, especially in the activity of the serum. The data of two recent studies are presented in table VII.

TABLE III—EFFECT OF ADDING PURIFIED THROMBOPLASTINOGEN TO PLASMAS OF CASE 1 AND OF KNOWN HAEMOPHILIACS

Subject	Amount of thromboplastinogen (ml.) added to 1·0 ml. of plasma*	Clotting-time (min.)	Modified prothrombin-consumption time† (sec.)
Case 1	0	..	8
"	0·005‡	3½	37
Hæmophiliac no. 1	0·005	3½	32
Hæmophiliac no. 2	0	15	9
" "	0·005	3½	20

* The native plasma stored in silicone-coated tubes at −20°C was used, which fact explains the short clotting-times.
† In addition to the thromboplastinogen 0·1 ml. of hæmolysate and 0·001 ml. of aged serum were added to 1·0 ml. of plasma.
‡ This amount was obtained from 0·05 ml. of normal human plasma.

Case 4.—This girl was born on Oct. 25, 1952. Her first serious bleeding was at the age of 9 months, when she cut a lip. During the first years of life her growth and weight gain were low, but otherwise she was normal except for bleeding. She bruises easily, has bled from her throat, and had hæmatemesis following a blow to her abdomen.

Her family history is entirely negative. She has a brother older than she and one younger; both are entirely normal. Her father and mother have never had abnormal bleeding, and their families have no record of bleeders.

The patient and her parents were only studied once. The data are recorded in table VIII.

Results

Case 1

The laboratory findings in case 1 are identical with those obtainable in true hæmophilia of the severest type (table I). No consumption of prothrombin can be demonstrated even with as sensitive a procedure as the hæmolysate test. The lack of correction in the consumption of prothrombin, when aged normal serum is added to the blood before clotting, localises the defect in the plasma; this localisation is confirmed by the thromboplastin-generation test. The close similarity between the

TABLE IV—LABORATORY DATA OF CASE 2 AND FAMILY

Test	Case 2	Youngest brother	Other brother	Father	Mother	Known hæmophiliac	Normal control
Clotting-time (min.)	10	8	6*	9	7	45	8
Prothrombin-time (sec.) ..	16	12½	13	12	13	12	12
Prothrombin-consumption time (sec):							
Basic	11	26	35	25	17½	8	32
With T.A.T. reagent	11	35	22	35	34	8	32
With hæmolysate	41	53		150	120	8	90
With aged serum	26	31		24	25	8	34
Thromboplastin-generation test (sec.):							
Subject's plasma	9	9		11	14	45	10
Subject's serum	25	59		20	21	9	10

* Studies were made in November, 1952.

TABLE V—EFFECT OF MIXING CASE 2'S PLASMA WITH PLASMAS FROM SEVERE HÆMOPHILIA

Plasma	Prothrombin-consumption time (sec.)
Case 2	11
Known hæmophiliac no. 1	8
" " no. 2	8
" " no. 3	8
Case 2 + hæmophiliac no. 1	16
" + " no. 2	17
" + " no. 3	14

patient's and hæmophilic blood is further shown by the lack of mutual correction when the two bloods are mixed; no consumption of prothrombin can be demonstrated even when hæmolysate is added before clotting (table II). When either the patient's or hæmophilic blood is mixed with normal blood, a significant correction takes place, measured by the prothrombin-consumption test, and the effect is quantitatively about the same. The strongest evidence known for concluding that the coagulation defect in the patient's blood is identical with that in true hæmophilic blood is the correction effected by adding even a minute amount of a purified preparation of thromboplastinogen to her blood. It will be observed from table III that 0·005 ml. of the preparation obtained from 0·05 ml. of normal plasma, when mixed with 1·0 ml. of her native plasma, increased the prothrombin consumption from 8 to 37 seconds. This correction corresponds quantitatively to that obtained when the same amount is added to hæmophilic plasma.

As in true hæmophilia, the girl's bleeding-time, prothrombin-time, and platelet-count are normal. Her

TABLE VI—EFFECT OF LABILE AND STABLE FACTORS ON CASE 2'S PROTHROMBIN-TIME

Plasma	Prothrombin-time (sec.)
Case 2	16
Case 2 + labile factor*	15
Case 2 + aged serum†	11
Normal control	11½
Case 2 + normal control (1:1)	11

* 0·01 ml. of rabbit plasma adsorbed with $Ca_3(PO_4)_2$ added to 0·1 ml. of case 2's plasma.
† 0·01 normal aged serum added to 0·1 ml. of case 2's plasma.

clinical history, likewise, corresponds to that usually obtained in classical hæmophilia. Epistaxis and other types of mucosal bleeding are absent or infrequent, whereas deep intramuscular hæmorrhages almost invariably follow injury, unless aborted by such means as cold and pressure. On the basis of the much prolonged clotting-time and the almost complete absence of prothrombin consumption, she should be classed as having severe hæmophilia. Her tendency to bleed has remained relatively mild. Although one may conclude from the history that she has had hæmarthroses, no permanent injury has been done to any joint.

Case 2

The laboratory findings in case 2 (table IV) are strikingly different from those in case 1. The clotting-time is only slightly prolonged, but the prothrombin-time is definitely prolonged. The prothrombin-consumption time and the thromboplastinogen-activity time are as abnormal as in mild hæmophilia. The addition of either hæmolysate or normal aged serum to the blood before clotting brings about normal consumption of prothrombin. The generation of thromboplastin, measured by the test of Biggs and Douglas (1953), is strikingly low, and the defect is in the serum. On mixing her native plasma with the plasma

TABLE VIII—LABORATORY RESULTS IN CASE 4 AND HER PARENTS

Test	Case 4	Father	Mother
Clotting-time (min.)	8	8	5½
Prothrombin-time (sec.)	12	11½	11½
Bleeding-time (min.)	30+		
Prothrombin-consumption time (sec.):			
Basic	12½	21	20
With T.A.T. reagent	12½	22	42
With hæmolysate	12	77	135
With serum	13	22	20
Thromboplastin-generation test (sec.)			
Subject's plasma	39	11	11½
Subject's serum	7	7	9

of a known hæmophiliac a mutual correction is obtained (table V). Her prothrombin-time appears to be fixed at 15 or 16 seconds; it is not shortened by adding labile factor but is corrected by adding aged normal serum. When an equal volume of her plasma is mixed with fresh normal plasma, the mixture has a normal prothrombin-time (table VI).

From the data in table IV it may be observed that both her parents and two brothers show abnormalities. All have a slightly prolonged prothrombin-time except the father, but he has shown this abnormality at other times. The abnormality is best shown by the thromboplastin-generation test. Interestingly, her youngest brother has a thromboplastin-generation time which is even more abnormal than hers although he is not a bleeder.

Case 3

This case, like cases 1 and 2, belongs to the hæmophilia-like group. Both the prothrombin consumption and the thromboplastinogen-activity time are distinctly abnormal (table VII). The most striking finding is the very prolonged bleeding-time. Curiously, the results of the various clotting-tests are not constant. The clotting-time is sometimes prolonged but often normal. Sometimes the additions of hæmolysate and of serum cause a fair increase in prothrombin consumption, but at other times they have only a slight effect. The thromboplastin-generation test

TABLE VII—LABORATORY RESULTS IN CASE 3 AND HER FAMILY

Test	Case 3		Younger brother*		Older brother		Father		Mother		Normal control
	July, 1956	May, 1957	July, 1956	May, 1957	July, 1956	May, 1957	July, 1956	May, 1957	July, 1956	May, 1957	
Clotting-time (min.)	14	9½	3+	9½	9	8	6½	9	8	9	5–10
Prothrombin-time (sec.)	12	12	12	12	12	12	12	12	12	12	12
Bleeding-time (min.)	30+	30+	30+	30+	..	3	..	3	..	3	1–3
Prothrombin-consumption time (sec.):											
Basic	12	13	11	10	35	22	18	14	26	17	16–35
With T.A.T. reagent	12	10	10½	9	..	18	..	25	..	27	16–35
With hæmolysate	21	43	27	20	..	100	..	70	..	70	45–90
With aged serum	16	23	15	15	..	27	..	29	..	27	16–35
Thromboplastin-generation test (sec.):											
Subject's plasma	24	34	40	40	8	14	9½	14	8½	15	8–10
Subject's serum	10	15½	9½	17	9½	17	8½	13	8½	13	8–10

* A bleeder with a clinical history very similar to that of case 3.

is constantly abnormal, and the defect resides in the plasma. Occasionally, however, the serum also seems to be defective.

The hereditary pattern can be discerned from table VII. The thromboplastin-generation test of the parents is at times abnormal. Since both the girl and one of her brothers have identical clinical and laboratory findings, it appears quite certain that the disease is hereditary.

Discussion

The occurrence of hæmophilia in the female can be accepted because a sufficient number of cases have been published which meet the diagnostic requirements: clinical history, specific laboratory findings, and correct hereditary pattern.

The cases reported by Israëls et al. (1951) and Pola and Svojítka (1957) are typical.

The patient of Taylor and Biggs (1957), who comes from a hæmophilic family and has a bleeder brother, has a normal son. This makes it improbable that both X chromosomes are defective.

Fantl and Margolis (1955) reported a female, with mild hæmophilia, who has a son who bleeds very easily, his blood closely resembling that of hæmophilia.

The patient of Choremis et al. (1956), a little girl, likewise appears to be a true hæmophiliac. Unfortunately, the family history was unobtainable.

Some cases—e.g., that reported by Beller and Koch (1956)—do not correspond to true hæmophilia clinically: mucosal bleeding is rather uncommon in hæmophilia.

Hardisty (1957) has reported in a woman a bleeding condition that appears to be Christmas disease.

Case 1 is particularly interesting because her blood is indistinguishable from that of true hæmophilia by all known tests. It is reasonably certain that the condition is congenital, because she had no serious illness before the discovery of her tendency to bleed. If her disease is true hæmophilia, the hæmophilic genes of both X chromosomes must be present. Since both her parents are clinically normal, the cause of her condition is best explained by mutation. This, to be sure, is speculation, and the proof can only be established by her offspring. All her sons should be bleeders and all her daughters carriers, if this assumption is correct.

Case 2 particularly illustrates the need for careful laboratory studies to establish a definitive diagnosis Without an accurately performed prothrombin-time test and thromboplastin-generation test one could easily mistake her disease and diagnose it as true hæmophilia. especially since her blood does not always effectively correct true hæmophilic blood. The prolonged prothrombin-time is not caused by lack of prothrombin or of labile factor. A serum factor from normal blood corrects both the prothrombin-consumption defect and the prothrombin time. Case 2 corresponds in most respects to that described by Hougie et al. (1957). Their patient had a much longer prothrombin time but otherwise closely resembles our case. They named the condition the " Stuart clotting defect ". The condition resembles that of the patient described by Telfer et al. (1956).

Cases 3 and 4 correspond to that first observed by Alexander and Goldstein (1953), Larrieu and Soulier (1953), and Quick and Hussey (1953b). The characteristic findings are the prolonged bleeding-time, the impaired consumption of prothrombin, and the poor generation of thromboplastin, with the defect in the plasma. Singer and Ramot (1956) suggest the term " pseudohæmophilia B " for this disease. " Pseudohæmophilia A " is the name given to von Willebrand's disease, which is likewise characterised by a prolonged bleeding-time but is transmitted as a dominant. Pseudohæmophilia B appears to be inherited as a recessive, only the homozygote being a bleeder.

The importance of bleeding in females is emphasised by the increased number of such patients reported recently. The desirability of standardisation of the diagnostic tests to differentiate the various hereditary bleeding-diseases in women is obvious because it is a primary requirement for their classification. A bleeding disease in a girl is especially serious because little is known about the hæmostatic control of menstrual bleeding. Nearly all the cases of women with hæmophilia-like conditions were over twenty years old when they were first studied, suggesting that their bleeding was relatively mild. Some of these patients—e.g., the one studied by Pola and Svojítka (1957)—have normal menstruation. A patient with hyperheparinæmia, whom we (Quick and Hussey 1953c) studied for several years, also has no abnormal menstrual bleeding, although her clotting-time is consistently about an hour. The management of a bleeder at the onset of the first menstruation is extremely difficult because so little information has been published and the effect of a coagulation defect on uterine bleeding is unpredictable.

Summary

Four girls with congenital bleeding conditions characterised by defective production of thromboplastin are reported.

Case 1's disease is indistinguishable from classical hæmophilia, except that the family history is negative.

Case 2 has, in addition to defective consumption of prothrombin and defective generation of thromboplastin, a prolonged prothrombin time. Her disease is similar or probably identical with the entity recently named " Stuart clotting defect ".

Cases 3 and 4 have a normal prothrombin time but a very prolonged bleeding-time, defective consumption of prothrombin, and faulty generation of thromboplastin. The suggested name " pseudohæmophilia B " has been tentatively accepted to designate this disease.

The differential diagnoses of this group of diseases is discussed, and their clinical and genetic aspects are presented.

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IMPORTANCE OF INTRAVENOUS INJECTION OF DIPHTHERIA ANTISERUM

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IT may be regarded as an accepted fact that, when diphtheria is suspected, the patient ought to be injected with antidiphtheritic serum without delay. It is indefensible to wait until the result of the bacteriological examination is known. The bacteriological diagnosis should only confirm the bedside diagnosis made by the practitioner. The desirability of the early injection of antiserum is discussed in more detail by Tasman and Lansberg (1957).

Opinions differ, however, about the best way of injecting antiserum. It is generally deemed advisable to inject it intramuscularly and only to resort to intravenous injection in severe cases (Chatterjee 1954, Gorter 1948, Hyman 1948, Cecil and Loeb 1952, Herderschee 1953, Christie 1955). Lepintre (1954) goes so far as to maintain that the antiserum must never be injected intravenously but should always be injected either intramuscularly or subcutaneously.

Tasman et al. (1954, 1955) have shown that the saliva of diphtheria patients usually contains diphtheria toxin. When purified diphtheria antiserum (obtained from horses) is injected intramuscularly, the antitoxin is sooner or later excreted in the saliva via the salivary glands and will then neutralise this toxin. Actively immunised persons do not excrete the (homologous) antitoxin in their blood through the salivary glands.

We thought it worth while to investigate this excretion of antitoxin through the salivary glands more closely and, more especially, to find if there were any differences in this respect between patients injected intramuscularly and those injected intravenously.

Excretion of Antitoxin in Saliva

The saliva of patients was tested for antitoxin at various times after either intramuscular or intravenous injection of purified diphtheria antiserum. The results are shown in table I.[1]

This excretion of antitoxin in the saliva via the salivary glands is very important. Our investigation showed that, after only 30 minutes, the saliva of all but one of the intravenously injected patients already contained antitoxin and had therefore become atoxic.[2] In other words, from this moment no more toxin would be absorbed from the saliva flowing over the inflamed and damaged membranes of the tonsils and the pharynx. In the intramuscularly injected patients this rapid excretion of antitoxin was exceptional; usually it was a long time before the saliva contained any antitoxin. During this interval diphtheria toxin could be absorbed from the saliva through the inflamed membranes of the tonsils and the pharynx.

TABLE I—EXCRETION OF ANTITOXIN IN SALIVA

Intramuscular injection (average dose 28,000 A.U.)		Intravenous injection (average dose 12,000 A.U.)	
No. of cases	Time taken for antitoxin to reach saliva	No. of cases	Time taken for antitoxin to reach saliva
1	30 min.	12	30 min.
3	4–5 hr.	1	6 hr.
3	10 hr.		
9	1–9 days		

This difference between the two groups of patients is the more striking because the intramuscularly injected patients received on the average 2·5 times as much antitoxin as did those injected intravenously.

Blood-serum Titres

We took samples of blood from patients before they received the antidiphtheritic serum either intravenously or intramuscularly and at set times after its injection, and determined the antitoxin titres. Table II shows the results in a greatly abridged form; the titres are expressed as percentages of the highest titre found.

1. For lack of space the numerical results of this investigation are given only in summarised form here. We hope to publish the full details elsewhere.
2. The first samples of saliva were taken 30 minutes after the serum had been injected. It is by no means inconceivable that antitoxin may appear in the saliva of the intravenously injected patients even before that time.

TABLE II—ANTITOXIN CONTENT OF BLOOD-SERUM OF PATIENTS INJECTED INTRAMUSCULARLY AND INTRAVENOUSLY

Intramuscular injection														Intravenous injection								
Case no.	Dose of antitoxin (A.U.)	Titres expressed as % of highest titre* Days after injection												Case no.	Dose of antitoxin (A.U.)	Titres expressed as % of highest titre found* Days after injection							
		1	2	4	6	8	10	12	14	16	18	20	22			1	2	4	6	8	10	12	14
1	60,000	33	56	100	100	78	67	56	44	33	22	17	11	1	10,000	100	89	55	43	43	43	37	17
2	40,000	44	74	100	96	..	..	..	..	..	..	..	..	2	10,000	..	100	71	43	28	20	14	6
3	20,000	27	38	100	80	..	..	..	..	..	..	..	..	3	10,000	100	..	66	37	30	30	30	20
4	40,000	44	75	100	..	75	50	25	..	19	13	..	5	4	10,000	100	78	56	56	44	44	..	22
5	40,000	100	100	67	..	50	33	..	..	..	..	..	..	5	10,000	100	78	56	44	44	..	11	4
6	20,000	40	60	70	100	80	..	48	..	34	..	..	12	6	10,000	100	82	64	64	..	25	25	..
7	20,000	23	46	92	100	77	53	..	30	23	..	20	18	7	10,000	100	100	..	..	63	33	13	..
8	20,000	100	..	85	63	..	38	..	21	11	8	..	..	8	10,000	100	55	55	37	..	10	..	..
9	20,000	77	100	100	77	50	..	..	43	37	..	..	..	9	10,000	100	64	44	33	22	17	13	..
10	20,000	35	83	100	70	56	50	..	40	..	20	..	..	10	10,000	100	60	40	30	24	20	16	..
11	80,000	30	64	100	64	50	40	24	..	14	10	..	..	11	10,000	100	62	38	25	19	13	7	7
12	20,000	50	80	100	100	70	..	36	..	28	..	26	..	12	10,000	100	..	56	44	28	17	11	5
13	80,000	23	100	85	..	40	34	34	..	18	..	..	9	13	10,000	100	98	98	58	29	29	21	16
14	20,000	60	96	100	64	54	40	24	..	14	..	9	..	14	10,000	100	90	..	..	37	24	..	17
15	20,000	45	77	100	70	54	..	37	..	30	..	..	11	15	10,000	100	100	25	25	25	..	..	10
16	20,000	56	100	46	46	46	..	25	..	25	..	25	..	16	10,000	100	..	67	..	..	30	20	18
17	8000	67	100	85	60	47	32	22	22	15	9	..	..	17	10,000	100	91	40	40	27	18	14	9
														18	10,000	100	50	30	17	10	6	4	3
														19	20,000	100	60	40	34	27	18	12	10
														20	10,000	100	56	46	37	25	19	11	13
	Mean	50	78	90	78	59	44	33	(33)	23	(13)	(19)	(11)		Mean	100	77	53	39	31	23	16	12

* In these calculations the titres before the injection of antiserum have been subtracted from the titres found after the injection because we are here concerned solely with the course of the antitoxin level resulting from the injection of heterologous diphtheria antitoxin

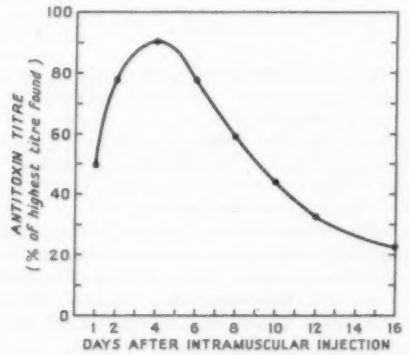

Fig. 1—Mean titres of antitoxin in serum after intramuscular injection.

The absorption and excretion of antitoxin from antiserum injected either intramuscularly or intravenously varied greatly from one patient to another. It is, however, obvious that the antiserum is absorbed much more slowly after intramuscular injection, the highest titre in the serum not being reached until after 2–6 days on the average.

The average titres expressed as percentages of the highest titre found are shown after intramuscular injection (fig. 1) and after intravenous injection (fig. 2).

One is immediately struck by the great similarity between the two curves of antitoxin titres. This is brought out even more clearly when the percentage titres (expressed as percentages of the highest titre found) are plotted on a logarithmic scale and in both cases the

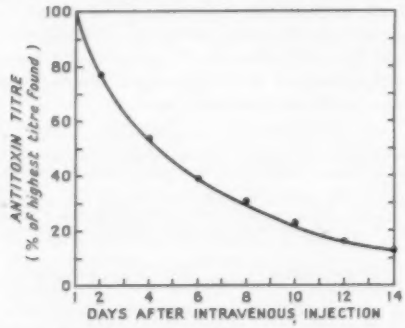

Fig. 2—Mean titres of antitoxin in serum after intravenous injection.

average titre found 4 days after the injection is taken as 100%.[3]

Fig. 3 gives the results of these calculations. Here the two lines practically coincide from the fourth day after the injection of the antiserum. From this we conclude that the antitoxin in the intravenously injected antiserum is not excreted more rapidly than that in the intramuscularly injected antiserum. Hence in this respect there is no reason why the intramuscular injection of antiserum should be preferred to the intravenous. Madsen (1936) reached the same conclusion after a similar investigation.

In view of these results the obvious thing would have been to test the presumptive superiority of the intravenous method, compared with the intramuscular, on a large number of patients; but such a plan would meet with many difficulties, the chief obstacle being the small number of diphtheria patients available at present. For this reason we confined ourselves to experiments with laboratory animals.

3. On the average the absorption of intramuscularly injected serum is complete at the end of this period. The subsequent excretion of this intramuscularly injected antitoxin is strictly comparable to that of the intravenously injected antitoxin.

Design and Application of an "Animal Model"

When a guineapig is injected with a certain number of lethal doses of diphtheria toxin it can be saved from death or protected from typical morbid symptoms by injecting antitoxin before or shortly after the injection of toxin. When the quantities of toxin and antitoxin to be injected have been fixed, the interval between the injection of toxin and that of antitoxin will determine the clinical picture. If a short interval is chosen, the guineapigs will show only very slight transient symptoms or

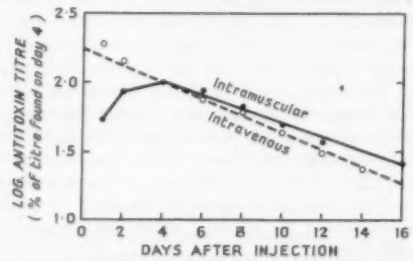

Fig. 3—Logarithms of titres of antitoxin in serum after intramuscular and after intravenous injection.

none at all. If a long interval is allowed, most of the guineapigs will show severe manifestations (much loss of weight, severe cardiac manifestations, and paralyses) or most of them will die.

In other words, therefore, a suitable choice of the three determining factors—amount of toxin, amount of antitoxin, and length of time between the two injections—will make it possible to control the clinical picture so that special attention can be given to different aspects of it.

A well-standardised "animal model" of this kind will also provide an excellent means of ascertaining experimentally the influence of a fourth factor—e.g., the route by which the antitoxin is injected.

After preliminary experiments we used male[4] guineapigs weighing 300–350 g. in all our further investigations. These were injected subcutaneously with 5 M.L.D. of diphtheria toxin at the beginning of each experiment. A certain number of hours afterwards the guineapigs were injected with 1 antitoxic unit of diphtheria antitoxin, half of them receiving this antitoxin intramuscularly and the

4. The intravenous injection of antiserum is technically much simpler in the male guineapig than in the female. The antiserum was injected into a branch of the femoral vein in the subcutaneous tissue of the inside of the thigh.

TABLE III—CHANGES OF WEIGHT OF GUINEAPIGS INTRAVENOUSLY OR INTRAMUSCULARLY INJECTED WITH DIPHTHERIA ANTITOXIN

Days elapsed after the injection or serum	Mean weight of guineapigs on consecutive days (g.)	
	Intravenously injected	Intramuscularly injected
0	306 (*100%*)	307 (*100%*)
1	316 (*103%*)	307 (*100%*)
2	308 (*101%*)	299 (*97·4%*)
3	305 (*99·7%*)	291 (*94·8%*)
4	291 (*95%*)	286 (*93·1%*)
5	294 (*96%*)	281 (*91·5%*)
6	293 (*95·7%*)	275 (*89·6%*)
7	289 (*94·4%*)	271 (*88%*)
8	289 (*94·4%*)	262 (*85·3%*)
9	286 (*93%*)	255 (*83%*)
10	289 (*94·4%*)	255 (*83%*)
11	293 (*95·7%*)	256 (*83·3%*)

other half intravenously. By determining beforehand the time required for the different injections it was possible to ensure that the time between the injection of the toxin and that of the antitoxin was the same for every guineapig in each experiment. In each experiment some guineapigs were injected with toxin only, without a subsequent injection of antitoxin, as controls. These controls were always dead on the 2nd or 3rd day after the injection of the toxin.

Experiment I

Two groups of guineapigs received 5 M.L.D. of diphtheria toxin subcutaneously; after 9 hours 1 A.U. of antitoxin was injected intramuscularly into 15 guineapigs and intravenously into 15 others. Of the intramuscularly injected guineapigs 4 died, after 2, 6, 7, and 9 days, whereas 4 of those injected intravenously died after 6, 7, 8, and 10 days. All the guineapigs were weighed twice daily, after which the mean weight of each group was calculated. Table III gives the results of this experiment, which are graphically represented in fig. 4. The initial weight per group is here taken as 100.

From these results we may conclude that the guineapigs injected intramuscularly with antiserum showed a greater and more prolonged loss of weight than did those injected intravenously. Therefore the general condition of the former

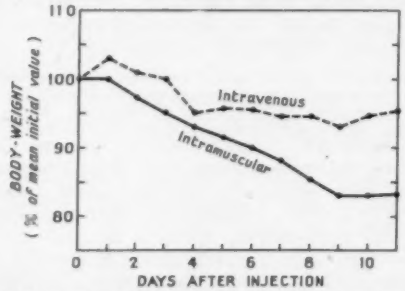

Fig. 4—Weights of guineapigs after intramuscular and intravenous injection of antidiphtheritic serum.

throughout the experiment was considerably worse than that of the latter under otherwise identical conditions.

Experiment II

If the interval between the injection of toxin and that of antitoxin is long, one may expect a greater number of deaths in both groups of guineapigs. To test the difference between the intramuscular and the intravenous injection of antiserum, two groups of 65 guineapigs were subcutaneously injected with 5 M.L.D. of diphtheria toxin. After 9½ hours they were given 1 A.U. of antitoxin. One group was injected intravenously with the antitoxin and the other intramuscularly. The results of this experiment are given in table IV.

These figures suggest that guineapigs previously treated with toxin have a considerably better chance of survival when injected intravenously than when injected intramuscularly with the same dose of diphtheria antitoxin.

It may at first sight seem strange that lengthening of the interval between the toxin and antitoxin injections by only 30 min. (from 9 to 9½ hr.) should have such a striking effect on the mortality-rate of the guineapigs. In experiment I (9 hr. interval) only 4 guineapigs died in each of the two groups (about 25%), whereas in experiment II (9½ hr. interval) 52% of the guineapigs died in one group and 86% in the other. This result is closely related to the experimental conditions. If we had chosen different doses of toxin and of antitoxin and a different interval we would have obtained results quantitatively different from these. For further general considerations on this " animal model " see below.

Experiment III

It was to be expected that the use of a considerably shorter interval between the injection of toxin and that of antitoxin would lead to fewer deaths and provide information about the effect of the method of injection on the paralyses which appear in a later stage of diphtheria.

TABLE IV—MORTALITY AMONG GUINEAPIGS INTRAVENOUSLY OR INTRAMUSCULARLY INJECTED WITH DIPHTHERIA ANTITOXIN, DIPHTHERIA TOXIN HAVING BEEN INJECTED 9½ HOURS BEFORE. NUMBER OF ANIMALS IN EACH GROUP 65; TOXIN DOSE 5 M.L.D.; ANTITOXIN DOSE 1 A.U.

Days elapsed after injection of serum	Deaths in each group of 65 daily	
	Injected intravenously	Injected intramuscularly
1	0	7
2	0	0
3	1	1
4	7	6
5	7	6
6	5	4
7	3	5
8	2	5
9	1	2
10	1	6
11	2	4
12	0	6
13	4	2
14	0	1
15	1	1
Total	34	56

For this purpose two groups of 46 and 48 guineapigs were given 5 M.L.D. of antitoxin subcutaneously and 6½ hours later were injected either intravenously or intramuscularly with 1 A.U. of antitoxin. Table V shows the incidence of paralysis: this primarily and chiefly affected the hind legs. Fig. 5 shows these results.

These data show that, under the conditions of the experiment, paralysis came on fairly late: after 16 days among the intramuscularly injected guineapigs, and not until after 21 days among those intravenously injected. 32 days after the beginning of the experiment all the intramuscularly injected guineapigs showed unmistakable signs of paralysis, whereas only 33% of those injected intravenously did so.

It thus appears that the intravenous injection of antiserum very considerably reduces the chance of the development of postdiphtheritic paralysis. These paralyses also appear later than they do after the intramuscular injection of antiserum.

Experiment IV

It is well known that the heart is the organ that suffers most from the harmful effect of diphtheria toxin. Therefore in our efforts to design a well-planned experiment we paid full attention to the heart.

For this purpose two groups of 184 guineapigs were subcutaneously injected with 5 M.L.D. of diphtheria toxin. After

TABLE V—INCIDENCE OF PARALYSIS AMONG GUINEAPIGS INTRAVENOUSLY OR INTRAMUSCULARLY INJECTED WITH DIPHTHERIA ANTITOXIN, DIPHTHERIA TOXIN HAVING BEEN INJECTED 6½ HOURS PREVIOUSLY. NUMBER OF ANIMALS IN EACH GROUP 46 (INJECTED INTRAVENOUSLY) AND 48 (INJECTED INTRAMUSCULARLY); TOXIN DOSE 5 M.L.D.; ANTITOXIN DOSE 1 A.U.

Days elapsed after injection of serum	Intravenous injection		Intramuscular injection	
	No. of animals with paralysis	Percentage of total number of guineapigs	No. of animals with paralysis	Percentage of total number of guineapigs
15	0	0	0	0
16	0	0	1	2·0
17	0	0	2	4·0
18	0	0	6	12·5
19	0	0	11	23·0
20	0	0	19	39·6
21	3	6·5	24	50·0
22	4	8·8	26	56·2
23	8	17·4	29	60·4
24	10	21·7	31	64·6
25	11	24·0	35	73·0
26	11	24·0	39	81·3
27	11	24·0	39	81·3
28	12	26·1	43	89·6
29	12	26·1	44	91·7
30	14	30·5	47	98·0
31	14	30·5	47	98·0
32	15	32·6	48	100·0

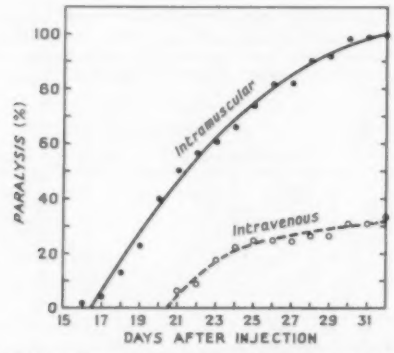

Fig. 5—Incidence of paralysis among guineapigs after intramuscular and intravenous injection of antidiphtheritic serum.

$6^1/_2$ hours they all received 1 A.U. of antitoxin, the first group intravenously and the second intramuscularly. After 1, 3, 6, 9, 12, and 15 days about a sixth of the guineapigs in each group were killed, and their hearts were removed and fixed in 20% aqueous solution of formalin. The guineapigs which had died spontaneously at the times mentioned were regarded as "killed", and their hearts were treated in the same way. Frozen sections were made of roughly the same part of the wall of the left ventricle of each heart. For the study of the myocardial lesions these sections were stained with hæmatoxylin-eosin. For the demonstration of fatty degeneration separate sections were stained with sudan III.

To provide a standard of comparison for the microscopically observed histological changes in the hearts of the treated guineapigs we killed 4 normal non-treated guineapigs per group of killed animals and spontaneous deaths. The hearts of these animals were prepared in the same way.

This pathological study was organised in such a way that the member of our team who performed the dissections and the microscopic examination (H. H. V.) never knew in advance to which category (injected or non-injected) the various guineapigs belonged. Thus an objective appreciation of the material was ensured.

As regards myocarditis, the changes observed ranged from very slight local infiltration with mononuclear cells to strong, practically diffuse, infiltration with many mononuclear cells, sometimes accompanied by leucocytes, lymphocytes, or fibroblasts.

As regards fatty degeneration of the heart, the mild cases showed only a few fat-globules in a few muscle-fibres. In severely degenerated hearts practically all the fibres contained numerous, sometimes fairly large, drops of fat.

In this experiment also some control guineapigs were injected with toxin only and not with serum. All died within 2 days, their hearts always showing considerable fatty degeneration.

The gravity of the lesions microscopically observed in the hearts of the different guineapigs varied greatly and was (more or less quantitatively) classified as $\pm$, $+$, $++$ or $+++$.

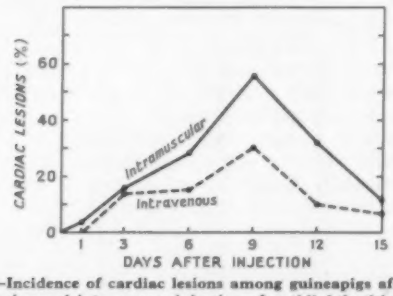

Fig. 6—Incidence of cardiac lesions among guineapigs after intramuscular and intravenous injection of antidiphtheritic serum.

Occasionally the non-injected controls (neither toxin nor antiserum) also showed slight lesions of the myocardium, classifiable as $\pm$ or $+$. This was the case in 15 of the 24 normal non-treated controls. Fatty degeneration of the heart was not found in any of the non-treated controls.

Some of the treated guineapigs also showed such slight lesions. It seemed only logical to leave these slight lesions, also found in non-treated controls, out of account. Consequently table VI includes only the grave lesions (myocarditis and fatty degeneration taken together). The data are also shown in fig. 6.

More or less severe lesions of the heart (myocarditis and fatty degeneration) were found in both groups. This is understandable because all the guineapigs had been exposed to the injurious action of 5 M.L.D. of diphtheria toxin for $6^1/_2$ hours before they were injected with antitoxin.

Under the conditions of the experiment these lesions reached their climax after 9 days, recovery then setting in at the same time in both groups. Of course this last circumstance may have been due to chance. It is not impossible that, if the experiment were arranged differently, the times of recovery would not coincide.

Finally we tried to divide the observed lesions into myocarditis and fatty degeneration.

The numerical data and graphs relating to this part of the investigation are not shown here, owing to shortage of space. It will suffice to state that the guineapigs injected intramuscularly with antidiphtheritic serum showed more cases of

TABLE VI—DISTRIBUTION OF SERIOUS LESIONS OF THE HEART FOUND AMONG THE VARIOUS GROUPS OF GUINEAPIGS GIVEN 5 M.L.D. OF TOXIN SUBCUTANEOUSLY, FOLLOWED BY INJECTION OF 1 A.U. OF ANTITOXIN INTRAMUSCULARLY OR INTRAVENOUSLY AFTER $6^1/_2$ HOURS

No. of days between serum injection and killing	Intravenously injected		Intramuscularly injected	
	No. killed	No. of heart lesions	No. killed	No. of heart lesions
1	30	0	30	1 (3·3%)
3	35	5 (14·3%)	38	6 (15·9%)
6	32	5 (15·6%)	31	9 (29·0%)
9	29	9 (31·0%)	30	17 (56·6%)
12	29	3 (10·3%)	30	10 (33·3%)
15	29	2 (7·0%)	25	3 (12·0%)

myocarditis and fatty degeneration of the heart than did the intravenously injected ones.

As regards the observed lesions of the heart, there again emerges a clear difference between the results of the two methods, which is strongly in favour of the intravenous injection of antiserum. This is easily explained. After the injection of intravenous antitoxin the serum of the guineapig is practically immediately "up to titre"—i.e., the total amount of antitoxin is available immediately for neutralisation of the toxin still circulating freely at that moment. This toxin can then no longer cause a lesion of the heart. Possibly part of the toxin which has already penetrated into the myocardium is also neutralised.

The effect of the intramuscular injection of antiserum is the same, but slower, because of the comparatively slow absorption of the antitoxin thus injected. The toxin still circulating freely is rendered inactive more slowly or can act longer on the myocardium, with all the consequences of this.

The difference between the antitoxin titres in the guineapigs injected intravenously and intramuscularly with antiserum will, of course, be greatest in the first few hours. This is undoubtedly responsible for the large difference in the incidence of cardiac damage.

Summary of Results of Experiments

Groups of guineapigs were subcutaneously injected, 2 at a time, with a constant dose of diphtheria toxin (5 M.L.D.). After a certain number of hours they all received a constant dose of antitoxin (1 A.U.), half of them being injected intravenously and the other half intramuscularly. The intravenous injection of antiserum

had a considerably greater therapeutic effect than had the intramuscular. The guineapigs injected intravenously with serum showed less loss of weight and more rapid recovery of weight, fewer deaths, less frequent and later development of paralysis, and fewer lesions of the heart (myocarditis and fatty degeneration) than did guineapigs injected intramuscularly.

Discussion

The experiments were made under strictly standardised conditions. The doses of toxin and of antitoxin injected were the same for all the guineapigs, which were all of the same sex and had the same weight in each pair. The time between the injection of toxin and that of antitoxin was the same for each pair. In this way we found a quantitative difference between the therapeutic effects of the intravenous and the intramuscular injection of antiserum. Had the criteria of these experiments (amount of toxin, amount of antitoxin, and interval between the two injections) been different, we would no doubt have seen the same qualitative differences, but the absolute figures would not have been the same.

Obviously the quantitative results obtained with this " animal model " cannot be quantitatively transferred to the therapy of human diphtheria patients. The criteria for the latter are different from those applied in the experiment on guineapigs.

If, however, the pathogenesis of human diphtheria is determined by the formation of toxin by the diphtheria bacillus infecting the patient and by the effects of this toxin, especially on the heart and the nervous system, we may indeed apply the qualitative results of these laboratory experiments to man.

Summarising the results of experiments I–III we may conclude that, for the treatment of human diphtheria also, the intravenous injection of diphtheria antiserum is much to be preferred to the intramuscular route for the following reasons:

(1) After the intravenous injection of antiserum the patient's serum is almost immediately " up to titre "—in other words, the total amount of diphtheria antitoxin is transported very quickly through the blood to the organs concerned. Intramuscularly injected antiserum is absorbed only slowly; on the average this absorption is not completed until after 4 days, but it may take as much as 6 days. The serum titres of the patients were determined 24 hours at the earliest after the injection of antitoxin; hence we cannot give any figures for the serum-antitoxin levels within a shorter time after the intramuscular or the intravenous injection. It can, however, safely be assumed that the relative and absolute differences will be large in the first few hours after the injection.

(2) As a non-specific protein, the intravenously injected antitoxin is not more quickly broken down and excreted than intramuscularly injected antitoxin.

(3) Very shortly after the intravenous injection of antiserum some of the antitoxin is excreted into the saliva through the salivary glands. From this moment the saliva is atoxic; henceforth no toxin can be absorbed from this saliva through the inflamed and damaged tonsils and wall of the pharynx. After the intramuscular injection of antiserum it usually takes many hours, sometimes even days, for this excretion of antitoxin through the salivary glands to get going. During this interval the saliva contains toxin which can be absorbed through the inflamed tonsils and wall of the pharynx.

(4) Lesions of the heart (myocarditis and fatty degeneration) will very probably be less common among intravenously injected than among intramuscularly injected patients. These lesions will presumably also be less serious among the former than among the latter.

(5) As a group, intravenously injected patients will very probably show fewer cases of paralysis than will intramuscularly injected patients.

(6) Under comparable conditions the mortality among intravenously injected patients is likely to be lower than among intramuscularly injected patients.

There is no danger attached to the intravenous injection of the antiserum, provided that certain precautions are taken. The skin test for hypersensitivity to the antiserum is especially important and should not be omitted.

For this test 0·2 ml. of the antiserum, diluted to a tenth with saline solution, should be injected intracutaneously on the flexor aspect of the forearm. It is absolutely imperative that a weal should form during this injection; if it does not, the intracutaneous injection must be considered unsuccessful and will have to be repeated.

If no redness or swelling shows within an hour after the intracutaneous injection, the intravenous injection can safely be given. Our experience with many hundreds of patients is that there are then never any serious reactions. Some hours after the intravenous injection of serum (enzymatically purified and radically despeciated horse-serum) a few of the patients had slight pyrexia, sometimes accompanied by a rigor. This type of reaction proved harmless.

If, however, the skin reaction is positive (redness and/or swelling), the serum must be injected intramuscularly and in very small portions at intervals of half an hour or an hour, under the supervision of an experienced person who, if necessary, can administer adrenaline (0·1–1·0 ml. of adrenaline hydrochloride 1 : 1000, according to the patient's age) if the patient shows obvious allergic phenomena.

Parish et al. (1957) propose a hypersensitivity test in which 0·2 ml. of undiluted serum is injected subcutaneously. If there is no general reaction within 30 minutes, the whole dose of serum can be injected either subcutaneously or intramuscularly without special precautions. This refers to the injection of a prophylactic dose of antitetanus serum (generally 1500 A.U. in 1 ml.).

We do not recommend this procedure for diphtheria patients. We believe that the risk of serious allergic reactions is much greater after the subcutaneous injection of 0·2 ml. of undiluted antidiphtheritic serum (4000 A.U. per ml., the protein content generally being greater than that of prophylactic antitetanic serum) than after the test injection described by us.

The doses of antidiphtheritic serum which we have given in the last few years have been 10,000–20,000 A.U. per patient according to age. The results of the determination of antitoxin titres after the intravenous injection have convinced us that an additional intramuscular injection of antidiphtheritic serum would be superfluous.

Provided that the precautions described above are observed, there is not the slightest objection to the intravenous injection of antiserum in all cases where an injection may be required. Consequently all these patients should be injected not intramuscularly but intravenously with diphtheria antitoxin. The intravenous injection of antiserum in patients suspected of diphtheria ought therefore to become the rule and should not be reserved for " serious " or toxic cases, as is still usually done at present.

Moreover it is by no means always possible to predict with certainty the course of the diphtheria. During an epidemic there have repeatedly been cases which initially seemed mild but became toxic within a few hours and rapidly fatal. Some of these patients would probably have been saved if they had been given an intravenous injection of antidiphtheritic serum at the earliest opportunity.

It should be borne in mind that, in cases of suspected diphtheria, the first object of the antiserum therapy is the quickest and completest possible elimination of any further absorption of diphtheria toxin (e.g., from the saliva) and the binding of the toxin still circulating. The investigations here described will have shown that not only the promptness of the injection but also its route can have a decisive effect. Not until this has been done will the treatment be directed to combating the damage already done to the heart, kidneys, and nervous system.

Summary

An investigation is described which clearly brought out the advantages of the intravenous injection of antitoxic serum in patients suspected of diphtheria, compared with the intramuscular injection still commonly used.

The intravenously injected antitoxin immediately brings the patient's serum "up to titre", whereas absorption of the intramuscularly injected antitoxin is slow, usually not being complete until after about 4 days, and sometimes 6 days.

Intravenously injected antitoxin is not excreted more rapidly than intramuscularly injected antitoxin.

Very shortly after the intravenous injection of antitoxin a small portion of it is excreted through the salivary glands into the saliva, which it renders atoxic. Consequently from this moment no more toxin will be absorbed from the saliva through the inflamed and damaged tonsils and wall of the pharynx.

The results of experiments on guineapigs indicate that patients intravenously injected with antidiphtheritic serum may be expected to show fewer lesions of the heart (myocarditis and fatty degeneration), fewer post-diphtheritic paralyses, and a lower mortality than patients intramuscularly injected with antiserum.

With due observance of the necessary precautions—e.g., a skin test for hypersensitivity (which must be negative)—diphtheria antitoxin should be injected not intramuscularly but intravenously whenever such an injection is required, even in mild cases of diphtheria.

We are greatly indebted to our colleagues Dr. W. Smit, Dr. J. Roos, Dr. G. L. Wilkens, Dr. H. M. van Vessem, Dr. A. van Dongen, and Dr. A. M. van Rooyen for submitting samples of the saliva and blood from their patients. Without their cooperation a considerable part of this investigation could not have been undertaken.

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"The only advantage that other animals can be supposed to have over man is, that being excluded by their nature from all mental enjoyments, they are also secured from all the pains and disquietudes that proceed from the same source; but to acquire an exemption from disquietude at the expense of being equally exempted from all the delicate feelings of the mind and affections of the heart, is a purchase which I hope no honest mind will ever be willing to make."—JOHN MOORE. *Medical Sketches*; pp. 223-4. London, 1786.

EPIDEMIOLOGY OF STILLBIRTHS AND INFANT DEATHS DUE TO CONGENITAL MALFORMATION

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THE cause of most fœtal malformations is obscure. Some types, both animal and human, are inherited and appear in accordance with the mendelian laws. The environment of the early embryo may be responsible for other types or may bring out latent tendencies; this has been proved experimentally in primitive animals and some mammals through changes of temperature and pH, mechanical injury, anoxia, dietetic deficiencies, and exposure to X-rays and chemical substances.

It is not known whether these factors cause malformations in man, but indirect evidence suggests that fœtal defects may sometimes be brought about by noxious agents or by an inadequate intrauterine environment. Abnormal implantation of the ovum, as in tubal pregnancy, is associated with a high incidence of malformations (Mall 1908). The incidence is increased if bleeding has occurred in the early months of pregnancy (Burge 1951, Turnbull and Walker 1956) and in diabetic pregnancies (Peel and Oakley 1949). Gregg's (1941) observation is now generally accepted, that infection with rubella in early pregnancy is often followed by the birth of a deformed child.

The incidence of congenital malformations is difficult to estimate. The best study based on a defined population is that of Record and McKeown (1949) dealing with Birmingham. Several reports based on hospital records are available; but, though the data are no doubt accurate, hospital patients are not necessarily representative of the population from which they are drawn. National statistics refer only to deaths certified as due to deformity, and are by no means comprehensive. Scottish vital statistics give much information about malformed stillbirths but very little about neonatal or infant deaths. Those for England and Wales give no information about the causes of stillbirths and little about infant deaths due to malformations.

This study deals with stillbirths and infant deaths associated with malformations. The main group used for analysis consists of 37,585 single births to booked patients delivered in the Aberdeen Maternity Hospital in 1938–55. Lest the trends found were produced by selection of patients for hospital confinement, these were compared with those in all Aberdeen births in 1949–55. (Records for 1938–48 were not available on a city-wide basis.) These local statistics are compared with certain national data derived from the annual reports of the Registrar-General for Scotland.

Method

Group 1.—The records of the Aberdeen Maternity Hospital for 1938–55 were searched for fœtal deformity in booked cases. The present analysis has been restricted to cases of stillbirth or of infant death. The records of infant deaths taking place some time after mother and child were discharged from hos-

TABLE I—DISTRIBUTION OF STILLBIRTHS AND INFANT DEATHS ASSOCIATED WITH CONGENITAL MALFORMATION, ACCORDING TO MATERNAL AGE AND PARITY

Expected numbers in parentheses; discrepancies in cross-totals are due to " rounding-off."
(Aberdeen Maternity Hospital booked cases, excluding twins and abortions, 1938–55)

Age (yr.)	Anencephalus					Other malformations of C.N.S.					Other malformations				
	Parity				Total	Parity				Total	Parity				Total
	1st	2nd	3rd	4th +		1st	2nd	3rd	4th +		1st	2nd	3rd	4th +	
–19	9 (3·8)	.. (0·5)	.. (0·0)	.. (0·0)	9 (4·4)	12 (5·6)	1 (0·7)	.. (0·1)	.. (0·0)	13 (6·4)	3 (5·7)	1 (0·9)	.. (0·1)	.. (0·0)	4 (6·5)
20–24	22 (13·0)	6 (6·0)	1 (1·8)	.. (0·6)	29 (21·5)	26 (19·1)	9 (8·8)	4 (2·7)	.. (0·9)	39 (31·5)	20 (19·3)	9 (8·9)	6 (2·7)	2 (0·9)	37 (31·8)
25–29	6 (6·5)	6 (6·3)	1 (3·2)	2 (2·2)	15 (18·1)	8 (9·5)	6 (9·2)	2 (4·7)	3 (3·2)	19 (26·6)	14 (9·6)	5 (9·3)	4 (4·8)	3 (3·2)	26 (26·9)
30–34	1 (2·1)	1 (3·1)	1 (2·2)	1 (2·5)	4 (10·0)	3 (3·1)	1 (4·6)	4 (3·3)	3 (3·6)	11 (14·7)	.. (3·2)	1 (4·7)	2 (3·3)	2 (3·7)	5 (14·9)
35 or more	.. (0·9)	.. (1·3)	.. (1·2)	3 (2·6)	3 (6·0)	2 (1·4)	.. (1·9)	1 (1·7)	3 (3·8)	6 (8·9)	2 (1·4)	4 (1·9)	4 (1·8)	7 (3·8)	17 (9·0)
Total	38 (26·4)	13 (17·2)	3 (8·5)	6 (7·8)	60 (60·0)	51 (38·7)	17 (25·3)	11 (12·5)	9 (11·5)	88 (88·0)	39 (39·2)	20 (25·6)	16 (12·6)	14 (11·6)	89 (89·0)

pital are unavoidably incomplete, especially through emigration from the city, but this fact is unlikely to have introduced bias of any importance. The data were analysed by age and parity.

Group 2.—Since 1949 punch-card records of all births in the city of Aberdeen have been maintained in the university department of midwifery, and those for 1949–55 have been used in this investigation to provide data referring to a defined population. In addition to an analysis by age and parity the data were examined for primiparæ by social class and height.

In groups 1 and 2 plural pregnancies were excluded to simplify analysis. In group 2 the analysis was further restricted to legitimate births to patients resident in the city.

Group 3.—The annual reports of the Registrar General for Scotland (1939–55) provided data for stillbirths attributed to fœtal malformation, broken down by social class and by region. Data by age and by parity (but not both together) are also available.

Results

Incidence

Among the 37,585 single births in group 1 were 237 stillbirths and infant deaths attributable to congenital malformation (6·3 per 1000 births). These included 60 due to anencephalus (1·6 per 1000 births), 88 due to other deformities of the central nervous system (2·3 per 1000 births), and 89 to other malformations (2·4 per 1000 births); the equivalent rates on the basis of 20,961 city births (group 2) were 1·5, 1·8, and 2·2 respectively.

It has been indicated above that these rates may be a little low owing to failure to identify all the infant deaths. Fully comparable data are not easily extracted from national statistics. In Scotland in 1939–55 the incidence of stillbirth certified as due to anencephalus was 2·7 per 1000; that of stillbirths plus first-year deaths due to malformations of the central nervous system was 3·7 per 1000; and those due to other types of malformations 3·9 per 1000.* These national rates are higher than those found for Aberdeen. It will be shown below that the stillbirth-rates due to anencephalus in the city of Aberdeen are lower than those in the other large Scottish cities.

Maternal Age and Parity

Table I gives the distribution by age and parity, in the Aberdeen Maternity Hospital group, of stillbirths and infant deaths due to the three groups of deformities distinguished above. Closely comparable results were obtained in the smaller Aberdeen city group. Since the numbers in several cells are very small, the calculation of rates is unprofitable, and instead the " expected numbers" in each age and parity group are shown; these have been calculated on the assumption that the cases of deformity were distributed in strict proportion to the total number of patients in each cell.

Among the younger primiparæ the number of stillbirths and infant deaths due to anencephalus and other malformations of the central nervous system is more than twice the expected number. No other notable excesses or deficits are evident. On the other hand, in the group of " other malformations " the only clear excess is among mothers aged 35 or more. The data show that much of the excess in the oldest age-group is attributable to mongolism. (The deficit in the age-group 30–34 is believed to be due to chance.)

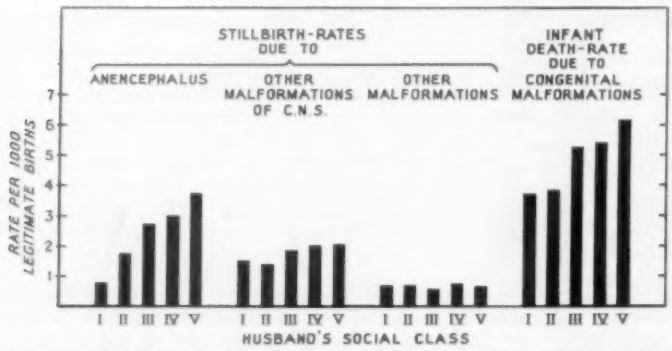
Comparable national figures are unavailable. The Registrar-General gives stillbirth-rates by age and by order of birth separately but does not give similar information for infant deaths. The stillbirth-rates by age show relatively high incidences for anencephalus before the age of 20 and after that of 35; those for other malformations of the central nervous system and for " other malformations " are high only at the older ages. Stillbirth-rates by birth order indicate an erratic increase with parity for anencephalus and other malformations of the central nervous system; there is no very definite trend by parity in the group " other malformations ".

* The national rate for anencephalus is presumably reasonably accurate, since the condition is easy to diagnose and virtually all anencephalic babies are stillborn. The rate cited here for other malformations of the central nervous system comprises stillbirths and infant deaths certified as due to hydrocephalus, spina bifida, and " other malformations of the central nervous system ". The group of " other malformations " (here assumed to exclude abnormalities of the central nervous system) includes deaths due to unspecified abnormalities, and " monsters ".

TABLE II—DISTRIBUTION OF STILLBIRTHS AND INFANT DEATHS DUE TO CONGENITAL MALFORMATION, BY MATERNAL HEIGHT AND SOCIAL CLASS

Expected numbers in parentheses; discrepancies in cross-totals are due to " rounding-off ".
(City of Aberdeen, legitimate first single births 1949–55)

Height	Anencephalus				Other malformations of C.N.S.				Other malformations			
	Social class			Total	Social class			Total	Social class			Total
	I and II	III	IV and V		I and II	III	IV and V		I and II	III	IV and V	
5 ft. 4 in. or more ..	.. (1·1)	2 (2·9)	1 (0·9)	3 (4·9)	.. (1·2)	6 (3·2)	1 (1·0)	7 (5·5)	.. (1·2)	3 (3·1)	.. (0·9)	3 (5·2)
5 ft. 1 in.–5 ft. 3½ in.	.. (1·1)	3 (5·1)	4 (2·1)	7 (8·3)	.. (1·2)	4 (5·7)	1 (2·4)	5 (9·3)	1 (1·1)	6 (5·4)	3 (2·3)	10 (8·8)
Less than 5 ft. 1 in.	2 (0·2)	.. (2·3)	5 (1·2)	7 (3·8)	1 (0·3)	2 (2·6)	4 (1·3)	7 (4·2)	.. (0·3)	4 (2·5)	1 (1·3)	5 (4·0)
Total	2 (2·4)	5 (10·4)	10 (4·2)	17 (17·0)	1 (2·7)	12 (11·6)	6 (4·7)	19 (19·0)	1 (2·6)	13 (11·0)	4 (4·5)	18 (18·0)



Incidence of stillbirths and infant deaths due to congenital malformations, according to social class (legitimate births, Scotland 1950–55).

Social Class and Height

In the data for 8245 married primiparæ resident and delivered in the city of Aberdeen in 1949–55 the social class and height were both specified in 8221 records. Table II gives the distribution of stillbirths and infant deaths in the three ætiological groups previously distinguished, together with the numbers expected. Although the numbers are small, there is clearly an excess of anencephalus and, to a lesser extent, of malformations of the central nervous system in the lower social classes and in small women. These trends do not appear in the group " other malformations."

The Registrar General for Scotland has, since 1950, published data relating to legitimate stillbirths due to congenital deformities. Fig. 1 shows that, as social status falls, there is a steady increase in the incidence of anencephalic stillbirths. There is a smaller, but similar, social-class trend in stillbirth-rates due to other malformations of the central nervous system but none in stillbirths from " other malformations ". Infant deaths due to " congenital malformation " also show an increase in rate as social class falls, but unfortunately these deaths cannot be subdivided into specific ætiological groups.

Geographical Differences

In 1950-55 there were 2919 stillbirths certified as due to congenital malformations among 563,863 births in Scotland—a rate of 5·17 per 1000 births. The distribution of these according to place of birth showed that the highest incidence was in central and southern Scotland, followed by the north-eastern counties, with the lowest incidence in the crofting counties in the north and west. These differences were due largely to variations in the incidence of anencephalic stillbirths, the incidence of which was as follows:

Crofting counties of North and West Scotland (Orkney, Shetland, Caithness, Sutherland, Ross and Cromarty, Inverness, Argyll, Bute)	1·29 per 1000 births
Mainly agricultural counties, central and north-east (Perth, Nairn, Moray, Banff, Aberdeen, Kincardine, Angus)	2·15 per 1000 births
Agricultural counties of south, with scattered industrial areas (Ayr, Wigton, Kirkcudbright, Dumfries, Peebles, Selkirk, Roxburgh, Berwick)	2·65 per 1000 births
Central counties, mainly industrial (Dunbarton, Clackmannan, Kinross, Fife, Lanark, Renfrew, Mid-, West, and East Lothian, Stirling)	2·95 per 1000 births

The incidence per 1000 births of anencephalic stillbirths in the four large cities of Scotland was: Aberdeen, 1·7; Edinburgh, 2·5; Dundee, 2·9; Glasgow, 3·1. The order is that which might be expected from a knowledge of the social history of each city, on the assumption that poor social conditions predispose to anencephalus.

Conclusions

The literature on the effects of age, parity, social class, and other factors on the incidence of fœtal malformations of various kinds is fairly extensive, but there is much disagreement, and few trends seem to have achieved general acceptance. The facts given here suggest that primigravidæ living in poor social circumstances, particularly in industrial communities, have a higher risk than any other group of pregnant women of fœtal death due to malformation of the central nervous system.

These facts are as follows:

(1) The geographical distribution in Scotland of stillbirths due to malformations of the central nervous system, especially anencephalus, shows the highest rates in the central industrial belt, and the lowest rates in the crofting counties of the west. These differences are unlikely to be due to differences of certification, and do not obtain in stillbirth-rates due to malformations other than those of the central nervous system.

(2) National statistics—available for women of all parities—show a distinct social-class gradient in stillbirths due to anencephalus; there is a less steep gradient in stillbirths due to other malformations of the central nervous system, and none in those due to " other malformations ".

(3) Aberdeen data point to a relatively high incidence of anencephalus and other malformations of the central nervous system in young primigravidæ, especially those aged less than 20. Very few of such young primigravidæ come from the upper social classes.

(4) Closer examination of the Aberdeen cases, which are too few to admit of definite conclusions being drawn, indicates that, within social classes IV and V, it is those undersized women, stunted by the environment in which they have grown, who have the highest incidence of stillbirth and infant death due to malformation of the central nervous system.

It is unprofitable, on present evidence, to speculate too far on the nature of possible environmental causes of congenital malformations, especially of the central nervous system. Several factors might act together or separately, and different factors may produce the same end-results by interfering with one specific phase of organogenesis. Nor should it be inferred from our data that environmental influences are necessarily major " causes " of malformations of the central nervous system; at most, such influences probably act by bringing out latent tendencies. The genetics of anencephalus have been discussed comprehensively by Penrose (1957).

One final point may be made: the hypothetical environmental influences need not necessarily be present for the first time during early pregnancy. For example, if a poor diet is regarded as a possible predisposing factor, chronic malnutrition during growth and adolescence may be as significant as an inadequate diet during early pregnancy. Prevention is likely to depend on long-term general measures which will secure high standards of growth and health. Measures aimed specifically at improving the diet and health of mothers during the first four weeks of pregnancy, by the end of which time the neural canal of the embryo has closed, are obviously impracticable.

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LEIOMYOMA OF STOMACH

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THE estimated incidence of gastric leiomyoma varies greatly. Meissner (1944) found twenty-three affected stomachs (eleven with multiple tumours) in fifty random necropsies, and Rieniets (1930) thirty-two affected stomachs in two hundred consecutive necropsies. Many of these tumours were but a few millimetres in diameter. Clinically significant tumours are much less common: Marshall (1955) states that 4·8% of gastric tumours are benign, while Minnes and Geschickter (1936) estimated that leiomyomata form 36% of benign gastric tumours and are the commonest type of benign new growth of the stomach. Thus it would seem that leiomyomata may account for about 2% of all gastric tumours. This agrees with Cowdell's (1950) estimate of 2·4% but is much higher than the estimate of 1 in 2000 given by Ingram and Johnson (1956), whose figure probably more closely corresponds to common experience.

The present case is reported because of the long period of preoperative observation, the confusion of the gastric mass with the spleen, and the success of surgery in a patient aged 84.

Fig. 1—Large ulcerated filling defect arising from the greater curvature.

Case-report

A woman, aged 78, was first seen in October, 1950, with a history of having vomited much blood ten days earlier, followed by the passage of black tarry stools. For the previous few months she had felt vaguely unwell with upper abdominal discomfort, which was slightly relieved by alkalis. She stated that three and a quarter years before this admission she had begun to feel tired and faint and was treated by her doctor for anæmia. On admission she was alert but very pale. The only significant finding was a mass situated in her left hypochondrium, measuring about 5 in. by 3 in., and resembling an enlarged spleen. Her hæmoglobin was 40%. She was treated by blood-transfusion and with ferrous sulphate by mouth, and on discharge her hæmoglobin was 88%. Biopsy of her sternal marrow showed that it was hyperplastic, with active erythropoiesis of normochromic type. Liver-function tests, bleeding-time, and clotting-time were normal. A barium meal showed no gastric or œsophageal varices but showed mild pseudohypertrophic gastritis. No gastric ulcer or neoplasm was seen, and the duodenal cap appeared normal.

The patient remained well for a year and then had a slight melæna. Two years after this (in October, 1953) she was readmitted with increasing listlessness, tiredness, and further melæna. On examination the same mass was felt and the hæmoglobin was 42%. Again the patient was transfused and given oral iron, her hæmoglobin being brought up to 83% before discharge. Thereafter she remained very well until August, 1957, when she was readmitted complaining of two days' faintness and passing tarry stools. She had had a small hæmatemesis three months before.

On admission the only significant finding was the mass situated below her left costal margin and extending almost to her umbilicus. There was no clinical evidence of portal hypertension or of hepatic failure. Her hæmoglobin was 38%, and a blood-transfusion was given, eight pints being required to increase her hæmoglobin to 81%.

Further treatment and progress.—When the patient's condition had sufficiently improved, liver-function tests were done and showed serum-bilirubin, direct 0·1 mg. per 100 ml., indirect 0·4 mg. per 100 ml., total 0·5 mg. per 100 ml.; serum-alkaline phosphatase 6 King-Armstrong units; thymol turbidity 1 unit; thymol flocculation 0 unit; serum-colloidal gold 0 unit; zinc-sulphate turbidity 4 units; ammonium-sulphate turbidity 1 unit. The episodes of bleeding were thought to be due to œsophageal varices in association with portal hypertension, the mass in the left hypochondrium being regarded as splenic. A barium swallow and meal showed that the œsophagus was normal. However, a large ulcerated filling defect arising from the greater curvature of the stomach was seen (fig. 1).

Laparotomy (Mr. Harold Edwards) revealed a hard irregular growth on the anterior wall of the stomach. There were enlarged lymph-nodes in the omentum, but the liver contained no metastases. A second pale yellow subserous tumour, 2 cm. in diameter, was seen on the anterior wall of the stomach 5 cm. above the larger mass. A sleeve resection of the stomach was done, the mass being removed entire. Postoperative progress was satisfactory, and on discharge the patient's hæmoglobin was 96%.

Pathological report (Dr. J. H. O. Earle).—The operation specimen was part of the stomach wall and measured 13 cm. × 8 cm., with a central protuberant area 5·5 cm. in diameter with central ulceration (fig. 2). This was continuous with the tumour (10·5 cm. × 12 cm. × 8 cm.) outside the stomach wall. On section the tumour was seen infiltrating between the mucosa and the serosa. Centrally it infiltrated directly through the serosa to spread as a large extragastric mass. The tumour appeared grey-white flecked with yellowish areas of necrosis and areas of hæmorrhage. Microscopy showed a leiomyoma with areas of degeneration and hæmorrhage. No invasion of lymph-nodes was found. The relative absence of mitoses and the mature type of muscle-cell indicated that the tumour was benign.

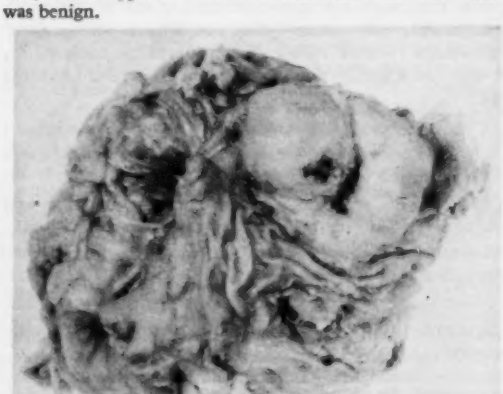

Fig. 2—Intragastric part of leiomyoma (operation specimen).

Discussion

Leiomyomata usually give rise to symptoms in the older age-groups, 75% in the fifth to seventh decades (Baker and Good 1955). In fifty-one cases reported with clinical details (Christensen 1957, Cowdell 1950, Davis and Adams 1956, Down 1930, Golden and Stout 1941, Harris 1957, Lund 1955, Marshall and Cherry 1955, Morrin 1956) bleeding was the commonest presentation (74%) and was more often severe and acute than occult. Abdominal pain occurred in 69%, and a mass was felt in 40%; in one case the mass was confused with the spleen. Other clinical manifestations include pyloric obstruction, volvulus of the stomach (Ker 1955), and perforation and bleeding into the peritoneum (Cowdell 1950, Millar 1928). Most cases present after a very short history, but where pain predominates the history may be long; in one there was a seven-year history and a barium meal showed displacement of the stomach six years before operation (Ker 1955). Another patient gave a fifteen-year history (Davis and Adams 1956). In no case has a recurrence been reported, even in cases followed for thirteen years (Morton, et al. 1956) and seventeen years (Harris 1957).

This description underlines the essentially benign nature of most of these tumours. Malignant deterioration is said to occur, but even histologically malignancy is difficult to determine (Golden and Stout 1941) and is best assessed by the frequency of mitotic figures (Lumb 1951). Death from hæmorrhage is a greater danger than malignancy, so resection is strongly indicated. The frequency of massive hæmorrhage and the absence of cachexia in the presence of an abdominal mass distinguish leiomyoma from carcinoma of the stomach.

Radiological abnormalities occur in the large majority of gastric leiomyomata (Baker and Good 1955), and the benign nature of the growth may be suggested by the radiological picture. A subserous tumour may be visible as a soft-tissue shadow on straight radiography (Davis and Adams 1956) and may displace surrounding viscera; it may distort the barium-filled stomach by traction, or by pressure appear as an extrinsic mass distorting the mucosal folds (Baker and Good 1956).

A submucous tumour may produce a punched-out filling defect of the barium-filled stomach, usually arising from the gastric wall and leaving the curvatures regular. The rugæ are obliterated in the immediate region of the tumour but around it appear normal in distribution and arrangement. The tumour does not disturb peristalsis or cause spasm (Moore 1924). When ulceration takes place, the mucosal folds do not converge on the crater (Abrams 1954).

Summary

A gastric leiomyoma was present for ten years before operation at the age of 84.

The principal features were repeated hæmorrhage and a palpable mass closely resembling an enlarged spleen.

A normal barium meal initially led to the diagnosis of splenic anæmia and œsophageal varices.

Seven years later the barium meal was grossly abnormal.

Successful removal of the tumour led to complete recovery.

I wish to thank Dr. T. C. Hunt, under whose care this patient was admitted, for his help and encouragement, and Mr. Edwards for the laparotomy and gastrectomy.

References at foot of next column

ACCIDENTAL POISONING IN CHILDHOOD

AN EXPERIMENTAL APPROACH TO THE PREVENTION OF POISONING BY TABLETS

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YOUNG children are often poisoned through swallowing drugs in tablet form which have been prescribed for adults, and it has been felt that the attractive appearance of these tablets is one factor in the problem. An experiment was therefore carried out to determine the frequency with which different colours were chosen by children when offered a selection of ten coloured tablets. By this means it was hoped to determine which colours were least popular among children and might therefore be most suitable for adult tablets.

Method

The children tested ranged in age from 1 to 8 years. Below the age of 1 the child tended to take more than one tablet, and his grasp was insufficiently accurate to allow of an assessment as to which was his primary choice. The same was true of some of those over 1 year of age, in which case the child was not included in the study. Those over 8 years were not included, since they were regarded as being beyond the age at risk. The children tested were inpatients, outpatients, and those attending for school medical examinations. Each child was offered a plate on which were ten lactose tablets coated in the following colours: blue, black, brown, orange, white, yellow, pink, green, wine, and magenta. For each child the plate was shaken and turned round to reduce any error from the child choosing the nearest tablet. Similarly, to obviate any personal bias in the adult making the test, a number of different testers were employed.

No attempt was made to introduce the question of different tastes into the test. It has been suggested that bitter tablets would be less often accidentally swallowed by children, but many of the poisons taken in this way do taste unpleasant; so it seems that the child can swallow a handful before he appreciates the unpleasant taste.

Results

613 children were tested, of whom 316 were boys and 297 girls. Age did not appear to be significant in relation to the colour chosen but the ages of the children were:

Age (yr.)	*No. of children tested*	*Age (yr.)*	*No. of children tested*
1	22	5	163
2	70	6	42
3	46	7	176
4	70	8	24

DR. HIGHMAN: REFERENCES

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The results, in order of preference, were:

NO. OF TABLETS SELECTED

Colour	Boys	Girls	Total
Magenta ..	52	52	104
Pink ..	39	35	74
Blue ..	25	41	66
Orange ..	33	31	64
Brown ..	36	25	61
Yellow ..	30	26	56
White ..	30	22	52
Green ..	21	26	47
Black ..	25	20	45
Wine ..	25	19	44

Discussion

These results show the bright colours to be the most popular, with magenta an easy winner. Brown, a dull colour, is relatively high on the list, presumably because of its similarity to chocolate. Wine and black are understandably found at the lower end of the list, though green's low placing was surprising.

The results suggest the use of black tablets; but these have the disadvantage that, if spilt on the floor, they would not so easily be seen and might later be picked up by children. It is significant that white, though a bright colour, was not in the popular range, and we think this may be because the children believed that the white one was a " pill " and not a sweet. In view of these results, and particularly if this argument is valid, it would seem wiser for tablets to be kept white in order that they should look like " pills ", rather than that attractive colours should be introduced which make them look like sweets. To achieve this it is not only a matter of persuading the chemist to manufacture white tablets, but of educating doctors and patients to accept only such tablets. Robinson (1956) pointed out that his firm (Evans Medical Supplies) had produced a white form of tab. ferr. sulph., but that these were not wanted and that the demand was for coloured tablets.

Against the use of white tablets it might be argued that aspirins are of this colour and yet often poison children. It is felt, however, that this is because aspirins are the commonest household tablet.

Finally it must be emphasised that the choice of a suitable colour is only one of the means of lowering the rate of accidental poisoning by tablets. Ideally (Jolly 1956) all poisonous tablets should be dispensed in ' Cellophane ' strips which are difficult for the child to undo and make him more likely to take only one tablet at a time. Unfortunately, the present competitive prices make such expensive packing impracticable for the manufacturer unless a policy could be agreed by all manufacturers.

The only real safeguard is for all tablets to be kept in locked containers.

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Addendum

Since this paper was written Grainger (1958) has reported an experiment using different coloured sweets. He came to the conclusion that children preferred the coloured to the white ones; but his experimental method was open to criticism, and this was raised by correspondents in the following two numbers of the same journal.

We are indebted to Glaxo Laboratories Ltd. for the coloured tablets.

ACUTE CASE OF WILSON'S DISEASE
(HEPATOLENTICULAR DEGENERATION)

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IT is now generally realised that hepatolenticular degeneration varies greatly in its speed of progression (Wilson 1912, Hall 1921, Raskin and Mackenzie 1956, Walshe 1956a, Bearn 1956) and in the relative prominence of neurological and hepatic symptoms (Bickel et al. 1955).

Walshe (1957) has reviewed Wilson's disease with particular reference to the biochemical lesion and has critically discussed the current theories of the pathogenesis of this disease.

The great majority of reports of the treatment of this condition are confined to the more chronic neurological cases. Acute cases seem to be altogether less common; but this may only reflect the greater difficulty in recognising the syndrome. We therefore report here the course of such an illness.

Case-report

A boy, aged 12 years, was admitted to Addenbrooke's Hospital on Dec. 29, 1955, with two weeks' history of malaise and anorexia. He had pain in both knees, and his parents said that his legs were swollen. Up to the time of this illness he had apparently been in good health.

Family history.—His parents are first cousins and both are healthy, as are his two surviving brothers. A brother who died at the age of 18 was reported to have had " paralysis " for four or five years after a head injury of unknown severity and finally to have died with " fits ". Inquiry has not thrown any further light on this illness; it may be compatible with a diagnosis of Wilson's disease but it is not conclusive.

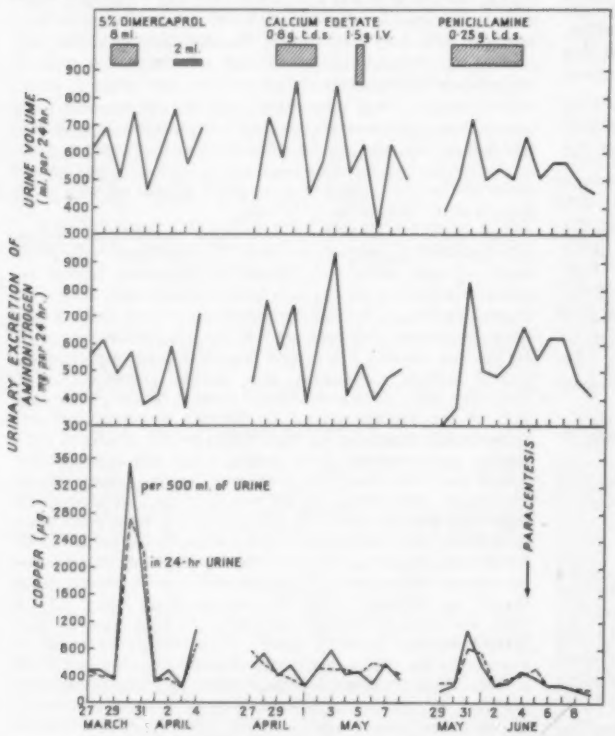
On examination the patient was pale, ill, and apprehensive, and did not speak or smile. He had conspicuous œdema of his legs and sacrum, and considerable abdominal distension, with much free fluid in the abdominal cavity. His liver and spleen could not be felt. Signs of a moderate pleural effusion were present at the base of his right lung.

Investigations.—Radiography revealed œsophageal varices and probably gastric varices also. The serum-protein level was 6·0 g. per 100 ml., and paper electrophoresis showed an extreme deficiency of albumin and a considerable excess of γ-globulin. The serum-bilirubin level was 0·6 mg. per 100 ml., serum-cholesterol 200 mg. per 100 ml., and serum-uric acid 2·0 mg. per 100 ml. The thymol flocculation test was negative, thymol turbidity 10 units, and alkaline phosphatase 7·8 Bodansky units. The prothrombin content of the plasma was 21% of the average normal by Quick's one-stage method. Symptomatic treatment for eight weeks having produced little clinical improvement, the patient's urine was collected for twenty-four hours with due precautions against contamination by copper. This contained 166 μg. of copper, an abnormally high value but not above the figures cited for some adult cases of cirrhosis, not clinically Wilson's disease, by Cartwright et al. (1954) and Bearn and Kunkel (1954). However, the serum-paraphenylenediamine-oxidase activity was 2 Bearn units (Bearn and Kunkel 1954), the normal range being 2·3–5·2 units, and cases of ordinary cirrhosis showing a raised or high normal activity (3·5–13·2 units). The urinary excretion of aminoacids was 0·47 g. per twenty-four hours, a high value for a child aged 12 years; electrophoresis and chromatography revealed an unusual aminoacid pattern in which histidine, tryptophane, lysine, aspartic acid, hydroxyproline, cystine, methionine, alanine, phenylalanine, glycine, valine, and leucine

were increased in amount, and threonine and citrulline were present in conspicuous amounts. (Taurine was present in normal amounts.)

Diagnosis and treatment.—On these findings Wilson's disease was diagnosed, and therapy with dimercaprol was begun. During the second course of this treatment the patient's daily output of urine decreased to 35 ml., and dimercaprol was withheld at once. No other toxic effects were noted. No clinical benefit was observed from this limited period of treatment, but much more copper was excreted (see figure). After four weeks' rest, in which no clinical change was observed, treatment with calcium edetate was followed by a slight increase in the output of copper. After four weeks penicillamine was given (Walshe 1956a and b). The initial increase in excretion of copper was poorly maintained, and the child, now severely ill, showed no improvement. The urinary output of aminoacids, unchanged by treatment with either dimercaprol or calcium edetate, increased during, and for some time after, penicillamine therapy, probably because penicillamine is an aminoacid which is excreted largely unchanged. During this period an extra band, having the same mobility as penicillamine, appeared in electrophoretic separations of urinary aminoacids.

Course.—During the five months' treatment in the ward this child had remained uncommunicative, with conspicuous lack of facial expression, indicating profound emotional disturbance. He was apt with his hands and fully aware of what went on in the ward. When interfered with, he was liable to outbursts of fighting and screaming. However, none of the neurological findings more usually associated with Wilson's disease were in evidence. Tremor was never detected. He developed spider nævi on his hands and face and conspicuous gynæcomastia. Kayser-Fleischer rings, hardly visible at first to the naked eye, were clearly seen on slit-lamp examination. A mild diplopia was also detected. Paracentesis was done for ascites on three occasions. On June 18, 1956, the boy lapsed into coma and died. Details of treatment and of urinary excretion of copper and aminoacids are given in the accompanying figure.



Treatment and urinary excretion of copper and aminoacids.

Necropsy findings.—The body was that of a wasted male child weighing 39 kg., with ascites and with pitting œdema of the ankles and thighs. The liver was small (985 g.), studded with yellowish nodules up to 0·6 cm. in diameter. The cut surface showed nodules throughout the substance of both lobes. The spleen was enlarged (625 g.) and had a firm solid pulp. Œsophageal varices were present. The outer and cut surfaces of the brain revealed no obvious abnormality, and no cavitation was seen in the basal ganglia.

Microscopy.—The liver showed severe fibrosis with regeneration nodules, some cells showing recent acute degeneration, and there was conspicuous infiltration with chronic inflammatory cells. The picture resembled subacute hepatitis with continuing necrosis. The basal ganglia showed a probable loss of neurones and an increase in glia, with pallidal siderosis, and fibrillar structures, probably microglial processes, which stained strongly with stains for copper. No abnormality was seen in any other section of the central nervous system. In the cornea pigment granules, histochemically containing copper, were seen in the membrane of Descemet, towards the limbus, confirming the presence of the Kayser-Fleischer rings. Apart from the Kayser-Fleischer rings the histological findings were not specific for Wilson's disease, but the presence of much copper in the tissues was demonstrated both histochemically and by bulk analysis. The histochemical techniques are described in the appendix (see below).

Discussion

The unusual features of this case are as follows:

(1) *The absence of tremor and neurological signs.*—The emotional behaviour, expressionless face, and paucity of speech were probably facets of the disturbance in Wilson's disease, but they are in themselves too indefinite to be regarded as signs of involvement of the central nervous system.

(2) *The absence of diagnostic pathology in the basal ganglia.*—Such cases have been reported before (e.g., Raskin and MacKenzie [1955]) and some of the changes in the ganglia (e.g., the copper-positive glial fibres) may be more specific than we at present realise.

(3) *The short duration of the illness.*—Several such cases have been published since the original description of Ormerod's case (Wilson 1912).

It therefore seems that this is a true case of Wilson's disease in which the liver dysfunction has dominated the clinical picture, and the disease has been so acute that the changes in the basal ganglia have not had time to reach cavitation before death. This case is similar to case 12 described by Bickel et al. (1957), who also describe two cases similar to the present case in that the Kayser-Fleischer rings were only discernible on slit-lamp examination. Chalmers et al. (1957) describe five cases of an " abdominal " form of Wilson's disease in which there were no significant neurological findings, and there seems to be little doubt that the present case belongs to this group.

In the present case, of the three agents at present available for therapy, dimercaprol seemed to be the most effective, but it necessitated frequent painful intramuscular injections; it is also very toxic and must be used with caution. Calcium edetate appeared to be relatively ineffective and, in view of the trouble of intravenous infusions, is clearly unsuitable for long term therapy.

Penicillamine may offer a good alternative to dimercaprol, especially where injections at short intervals are impracticable. Walshe (1956a) and Osborn and Walshe (1958) compare it very favourably with dimercaprol. Our findings as regards the relative efficacy of dimercaprol, calcium edetate, and penicillamine in promoting urinary excretion of copper are most unusual. The case, however, was of a very exceptional type, and the disease was nearing a fatal termination when calcium edetate and penicillamine were tried. Intravenous infusions of coëruloplasmin have been tried (Bickel et al. 1957), but their clinical value is not yet clear.

Summary

An acute case of Wilson's disease is described, together with the necropsy findings. Minimal involvement of the central nervous system was associated with an excessive urinary excretion of copper and aminoacids, and a low serum-paraphenylenediame-oxidase activity. Treatment with dimercaprol greatly increased the copper output, calcium edetate and penicillamine being less effective.

We wish to thank Dr. D. Gairdner and Dr. J. D. Roscoe for permission to publish and for advice on the presentation of the clinical material; Dr. A. M. Barrett for his help with the histology; Mr. G. C. Spurgeon for technical assistance in the preparation of the histological material, and the Distillers' Co. Ltd. for a gift of penicillamine.

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Appendix

Methods

Copper was estimated by a slight modification of the method of Eden and Green (1940), with due care to avoid contamination. We obtained duplication of analyses within ±4% of their mean, and a reagent blank of not more than 1 μg. of copper.

Cœruloplasmin was estimated by the method cited by Bearn and Kunkel (1954).

Total aminonitrogen was determined by the method of Albanese and Irby (1944). Urinary aminoacids were studied by zone electrophoresis and by two-dimensional chromotography.

Material for histochemical study was fixed in neutral buffered formol saline (pH = 7·0), prepared with analar reagents, and containing 31μg. of copper per litre. The hæmatoxylin technique of Mallory and Parker (1931) was used to search for excessive copper; since this technique is of rather doubtful specificity, positive material was then stained with 0·5% rubeanic acid in ethanol and with 1% dithiosemicarbazone in citric-acid solution. Positive reactions with all three stains were obtained in liver, cornea, and basal ganglia.

"Dr. Betts found when he visited patients, that when he seemed to be in great haste, they used to detain him long upon some frivolous questions, and when he took no great notice but began to ask questions himself, they never endeavoured to stay him, by which practice his visits were but short, wherever he came."—Journal-Book of the Royal Society for June 19, 1700. *Notes and Records of the Royal Society of London*, 1951, **8**, 157.

POPLITEAL EMBOLECTOMY WITH RETROGRADE FLUSHING VIA THE POSTERIOR TIBIAL ARTERY

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THE conservative approach to the treatment of peripheral arterial embolism has inherent limitations. For instance, such treatment is usually deemed successful if the limb is saved, though generally under such circumstances residual ischæmic symptoms persist and may be severe. On the other hand, successful embolectomy has a more satisfactory end-result, as the limb is returned to normal. When embolectomy is unsuccessful it is usually because it is undertaken too late, after distal arterial thrombosis has begun, aided perhaps by fragmentation of the embolus. Under these conditions Shaw (1956) has shown that a more aggressive surgical approach is necessary. This entails opening the artery distally and flushing it out retrogradely with heparin in saline solution.

I here report a case of popliteal-artery embolism with distal thrombosis which was successfully treated in this manner.

Case-report

A man, aged 51, entered hospital because of severe pain, of seven hours' duration, in the left popliteal fossa. The pain was of sudden onset, and spread to become generalised over the upper calf. He noted intense pallor, coldness, and numbness of his foot. He could not walk and latterly had had some difficulty moving his toes. He had had atrial fibrillation, complicating rheumatic heart-disease, for several years.

Examination.—His pulse was irregular (rate 96 a minute), and blood-pressure 150/78 mm. Hg. A systolic murmur was present over the cardiac apex. The left leg was cold and cyanotic from midcalf level, with diminished sensation over this area. Although active movements of the toes and ankle were possible, weakness was obvious, both of dorsiflexion and plantarflexion. The left femoral and popliteal pulses were easily palpated, but both anterior and posterior tibial pulses were absent. On the right side the peripheral pulses were present.

Treatment.—Anticoagulant therapy was begun and peripheral vasodilatation encouraged by sedation, the administration of whisky, and heating the trunk and hands. After three hours there was no improvement in the condition of the left leg; the skin temperature fell 5°C during this period. Operation was undertaken.

Operation.—Under general anæsthesia the left popliteal artery was exposed and opened about 2 inches above its bifurcation. Good bleeding was obtained from the proximal end, but none from the distal end. Suction via polyethylene tubing was without effect. The posterior tibial artery was then exposed at the ankle and opened. No clot was present. By use of a 50 ml. syringe, retrograde flushing was carried out with heparin in physiological saline solution (10,000 units heparin per 500 ml.). Small fragments of clot escaped via the popliteal arteriotomy. 300 ml. of solution was used. Both arterial incisions were then closed. Before skin closure, no pulse was palpated in the posterior tibial artery. At the end of operation the condition of the leg had greatly improved. There was no

Arteriogram ten weeks after embolectomy, showing patent popliteal and proximal anterior and posterior tibial arteries.

cyanosis or pallor, the foot and toes being of good colour. Neither anterior nor posterior tibial artery could be palpated.

Postoperative progress.—The condition of the patient's foot remained satisfactory, and the posterior tibial pulse was palpable on the seventh postoperative day; but some weakness of dorsiflexion of the foot persisted. Anticoagulant therapy was begun on the seventh postoperative day, and was continued for two months. An arteriogram ten weeks after operation showed that the popliteal and posterior tibial arteries were patent (see fig. 1). The anterior tibial artery was blocked about midcalf level. Six months after operation weakness of dorsiflexion persisted. There were no other complaints.

It seems likely that the return of an adequate peripheral circulation was due to the retrograde flushing with removal of fragments of embolus and propagated thrombus from the posterial tibial artery. The persistent weakness of dorsiflexion of the ankle may have resulted from damage to the lateral popliteal nerve during operation or may have been the result of ischæmia. The former was not considered likely since the nerve in question was neither stretched nor damaged at operation. The possibility of ischæmic damage was suggested by the postoperative arteriographic findings. This underlined the need for retrograde flushing of the anterior as well as the posterior tibial artery in similar circumstances.

Discussion

The exact place of surgery in the treatment of peripheral arterial embolism is a matter of some dispute. The advent of the anticoagulant drugs laid emphasis on the conservative approach, which was furthermore often held justified because of the poor results of late surgery—notwithstanding the knowledge that the results of surgery were better the earlier embolectomy was undertaken. It is wise in early cases to initiate conservative measures, but these must be abandoned for surgery if after two to three hours the peripheral circulation has failed to improve. In late cases there is the added possibility of the presence of distal propagated thrombus, and indeed the likely presence of such clot has been regarded as justifying a refusal to operate.

It is now apparent that by means of retrograde flushing some cases may be retrieved after the lapse of over twenty-four hours from the onset of ischæmia, and even where gross ischæmic changes, such as anæsthesia and complete loss of power, are present (Shaw 1956). This procedure was first described by Lerman et al. (1930), and was revived by Shaw and by Crawford and DeBakey (1956). Shaw has applied it with success in late cases of acute thrombosis as well as embolism, in one instance thirty-three hours after the onset of severe ischæmic changes in the limb.

With few exceptions only surgery can restore the limb to normal in cases of acute arterial insufficiency due to embolism or thrombosis; and, even after delay has led to considerable deterioration in the limb, operation may still restore the peripheral circulation.

Summary

A case of embolism of the popliteal artery was treated by popliteal and posterior-tibial arteriotomies with retrograde flushing to remove emboli and propagated thrombus.

Adequate circulation was restored.

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Medical Societies

AMERICAN GASTROENTEROLOGICAL ASSOCIATION

THE Association's 59th annual meeting was held, under the chairmanship of Dr. CLIFFORD J. BARBORKA (Chicago, Ill.), at Washington on May 30 and 31.

Bilirubin Metabolism

Dr. RUDI SCHMID (Boston, Mass.) traced bilirubin production from the breakdown of a red blood-cell at the end of its 120-day lifespan. The protoporphyrin ring is broken open to yield biliverdin; and this in turn yields free bilirubin, which is insoluble. Solubility is achieved after passage through the liver, which conjugates one molecule of the compound with two molecules of glucuronic acid. The insolubility of the free form and the solubility of the diglucuronide form of bilirubin account for the indirect and direct van den Bergh reactions. The insoluble free form cannot be excreted by the kidney; hence in hæmolytic anæmias jaundice is acholuric since only the free form is present in excess. Congenital non-hæmolytic jaundice is due to an intrahepatic enzymatic defect causing failure of conjugation of free bilirubin with glucuronic acid, as can be demonstrated in a strain of rats subject to this defect. Jaundice of the newborn may be due to delay in development of the same mechanism.

Dr. IRWIN M. ARIAS (New York) outlined the enzyme system responsible for the conjugation of bilirubin within the liver. Glucuronic acid is mobilised by a transferase from uridine diphosphate glucuronic acid (U.D.P.G.A.). This system has many applications; it is the method of transporting and excreting salicylates, which patients with the rare congenital condition of non-hæmolytic jaundice cannot metabolise.

Dr. KURT ISSELBACHER (Boston, Mass.) pointed out that the U.D.P.G.A. transferase system has many purposes either for detoxification by rendering substances physiologically inactive, or for making substances soluble; the corticosteroids, the sex hormones, thyroxine, morphine, and adrenaline are metabolised by the system—and serotonin to a lesser extent. Glucuronide is formed from glycogen and glucose and becomes attached to uridine diphosphate.

Dr. JESSE L. BOLLMAN (Rochester, Minn.) referred to the monoglucuronide form of bilirubin which is found in the serum of dogs after removal of the liver when the diglucuronide is of necessity absent. After experimental damage to the liver following administration of carbon tetrachloride, diglucuronide is much reduced and monoglucuronide proportionally increased. The ratio of the di- to the mono- form—normally 3 to 1—may provide a basis for a diagnostic test in cases of jaundice. In obstructive jaundice liver cells still function and an abnormally high proportion of diglucuronide can be demonstrated; whereas in hepatitis the proportion of diglucuronide is abnormally low. In chlorpromazine jaundice there is a preponderance of monoglucuronide, suggesting hepatocellular damage rather than obstruction due to œdema of the intrahepatic ducts. The presence of monoglucuronide after liver extirpation in dogs seems to suggest an extrahepatic site of conjugation.

Assessment of Liver Function

Dr. NORBERT HENNING (Erlangen, Germany) assesses portal circulation-times by duodenal instillation either of

an acetylene derivative from which acetylene is metabolised by the liver and excreted from the lungs and can then be estimated in the expired air; or of ^{131}I, the rate of decrease in radioactivity over the duodenum then being determined. An increased portal pressure can be revealed by the pressure at which rectal mucosa blanches on direct contact through a sigmoidoscope. Alternatively the amount of heat which may be reabsorbed through a thermocouple in contact with colonic mucosa from a source of heat applied to the mucosa at a point nearby is directly proportional to the portal flow.

Dr. E. ENGLERT (Boston, Mass.) has been using radioactive rose-bengal to study uptake in liver from the blood, liver storage, and excretion.

Dr. E. PINEDA (Boston, Mass.) showed how the enzyme β-glucuronidase in the serum increases in hepatitis and falls below normal levels in liver failure; while Dr. K. S. HENLEY (Ann Arbor, Michigan) has devised a technique for studying liver parenchymatous cells alone to the exclusion of the Kupfer cells and thus the enzymes glutamic oxalacetic transaminase and glutamic pyruvic transaminase; his work indicates that G.P.T. is a more sensitive guide to hepatic dysfunction than is G.O.T.

Dr. F. WROBLEWSKI (New York) observed that changes of enzyme level in the serum do not reflect liver necrosis, nor liver function generally.

Dr. G. JERZY GLASS (New York), using radioactive vitamin B_{12}, has shown that the greatest bodily store of this vitamin is in the liver, where the substance is in greater concentration than elsewhere; vitamin B_{12} is stored to a far lesser extent in the kidneys.

The Pancreas

Opening a symposium in memory of the late Dr. Mandred W. Comfort, Dr. PAUL NEMIR (Philadelphia, Pa.) said that he has found that interstitial non-lethal pancreatitis follows the experimental intraperitoneal injection of activated pancreatic juice obtained from an isolated jejunal loop; it also follows injection of mixtures of pancreatic juice and organisms such as *Clostridium welchii* and *Escherichia coli*. By contrast, activated pancreatic juice mixed with blood is highly toxic, and on injection causes lethal acute necrotising pancreatitis. From this Dr. Nemir inferred that in man pancreatitis becomes severe when vascular damage to the gland permits the escape of blood which then comes into contact with the enzymatic action of the liberated pancreatic juices.

Dr. HENRY JANOWITZ (New York) has found that the trans-sphincteric rate of flow of pancreatic juice following secretin injection in patients with chronic pancreatitis, half of whom had radiological evidence of calcification in the gland, was not substantially less than in a control group of patients. There was therefore little evidence to indicate ductal obstruction. Dr. MORTON GROSSMAN (Los Angeles, Cal.) challenged this conclusion, since partial obstruction has been shown physiologically not to decrease but rather to increase the rate of flow.

Dr. JOHN BUDD (St. Louis, Missouri) compared the urinary-diastase and serum-amylase levels in different pancreatic conditions. Though in acute pancreatitis there is parallelism between the two initially, the diastase in urine remains increased longer; so this test may be used as an indication of persistence of the disease. In hæmorrhagic disease, only the urinary diastase may be affected—and that at a later stage. Estimation of urinary diastase has a place, therefore, as a clinical test in pancreatic disease.

Gastrointestinal Motility

Two new techniques for studying gastrointestinal motility were described.

Dr. G. VANTRAPPAN and his colleagues (Chicago, Ill.) have been able to obtain simultaneous fluorocinematography pictures and a record of intraluminal pressure on the same screen, and so to be certain of the type of peristaltic wave change inducing pressure changes. This technique has been used to study normal deglutition, tertiary œsophageal contractions, and diffuse spasm of the œsophagus.

In the second new technique (Dr. J. T. FARRAR [New York]) intraluminal pressures are recorded by the use of an ingestible, pressure-sensitive radiotelemetering capsule, or " radio pill ". The capsule, 3 cm. long and 1 cm. in diameter, contains a replaceable battery lasting twenty-four hours, a frequency-modulation transistor radio transmitter, and a pressure-sensitive diaphragm. Pressure change transmits signals to a frequency-modulation receiver, displayed on an oscilloscope and recorded on paper. It has been found possible to obtain records from stomach, small intestine, and right colon which correlate well in frequency and appearance with those recorded by other methods. This technique has a particular place in the study of functional disorders of small and large bowel over long periods.

Dr. CHARLES CODE (Rochester, Minn.) spoke of the enormous potentialities of both methods.

Carcinoidosis

In the Association's annual memorial lecture, Prof. JAN WALDENSTRÖM (Malmö, Sweden) discussed 156 cases of carcinoidosis. He stressed the predilection of the endocardial lesions for the right side of the heart, the frequencies of valvular involvement being pulmonary 35, tricuspid 36, mitral 12, and aortic 4. He also produced histological evidence that the endocardial lesion is biochemically induced. He described a case of carcinoidosis in which the primary tumour existed in a teratoma. In some instances a severe pellagra-like syndrome is associated with the clinical picture, and Professor Waldenström suggested a possible biochemical reason for this association. The antiserotonin drugs have proved disappointing, and no medical treatment is of value; surgical excision offers the only hope of remission.

Effects of Serotonin on Gastrointestinal Tract

Dr. B. J. HAVERBACK (Los Angeles, California) said that serotonin and its precursor 5-hydroxytryptophan powerfully stimulate intestinal motility—an effect which is potentiated by lysergic acid diethylamide and inhibited by bromlysergic acid diethylamide and histamine-releasing substances. Normal ranges of blood-serotonin and urinary 5-hydroxyindoleacetic-acid levels are 0·15–0·5 μg. per mg. of platelet protein and 2–9 mg. per 24 hr. respectively. Studies on patients who had undergone intestinal resection suggest that the gastrointestinal tract makes a major contribution to the blood level and urinary output of serotonin.

In the ensuing discussion it was pointed out that the urinary excretion of 5-hydroxyindoleacetic acid is temporarily increased after eating bananas, which contain large amounts of serotonin, that it is increased in the patient with idiopathic steatorrhœa in relapse, which is thus distinguishable from other types of steatorrhœa in which the urinary levels are normal. Remissions induced by the gluten-free diet are accompanied by a decrease in

the urinary elimination of 5-hydroxyindoleacetic acid to normal levels. Raised urinary levels have also been observed in some patients with schizophrenia.

Diverticulosis

Dr. R. S. BOLES and Dr. S. M. JORDAN (Boston, Mass.) described a study of 294 patients with diverticulosis who were followed for between ten and thirty-one years. 25% later had diverticulitis, and 6% developed symptoms attributable to diverticulosis—namely, obstruction, bleeding, and fistula formation. While obstruction seems to be statistically related to the number of attacks of inflammation, bleeding and perforation seem to be unrelated to the number of attacks. Cancer developed in 5% of patients with uncomplicated diverticulosis, in 3·6% of those with diverticulosis associated with complications, and in 6·8% of those with diverticulitis; but the correlation was not clear, and cancer commonly developed in areas unaffected by disease.

Antibiotics

In a critical bacteriological appraisal of antibiotics for colon surgery, Dr. I. COHN, Jr. (New Orleans, Louisiana), found most of the drugs usually recommended—particularly sulphonamides—unsatisfactory in the control of the intestinal flora.

He recommended a combination of neomycin and achromycin, and has obtained good results by injecting the antibiotics down a fine plastic tube to the anastomosis site.

Regional Enteritis

A panel consisting of Dr. J. A. BARGEN (Rochester, Minn.), Mr. B. N. BROOKE (Birmingham, England), Dr. R. B. CATTELL (Boston, Mass.), Dr. J. B. KIRSNER (Chicago, Ill.), and Dr. F. E. TEMPLETON (Seattle, Washington), with Dr. B. B. CROHN (New York) as chairman, discussed regional enteritis.

The ætiology of the condition remains obscure. Familial examples of the condition have been reported, but heredity plays only a minor role. Mesenteric glandular enlargement seems to be secondary rather than primary. It is largely a disease of young people; in a large series the average age was 27·3 (range 4–74); it runs a long course and often recurs after operation—in fact, in the Mayo Clinic series 135 out of 400 patients had had recurrences after two to six years, and these recurrences were commonest in young people. The ten-year-survival rate was 81%.

Radiographic identification of the disease is extremely difficult, but with care is possible in 50% of cases. Serial thirty-minute films after oral administration of flocculating barium suspension was recommended; but terminal ileum can usually be better displayed by a barium enema. The stenosing lesion is easily identified, but other forms are difficult to detect. The deficiency pattern and cobblestone mucosal change, though often helpful, are non-specific.

Mr. Brooke described the distribution of the initial lesions in 121 patients: these were duodenal or jejunal 14, ileal 48, ileocæcal 40, colonic and ileal 12, and colonic alone 7; thus 62 had ileal lesion alone, and 59 combined involvement of small and large bowel.

As to treatment it was generally agreed that medical treatment should be applied initially, and surgery reserved for the complications of obstruction and fistula formation. Bed rest, high-protein high-calorie diet, hæmatinics, blood-transfusion, and electrolyte replacement were recommended. Neomycin or achromycin often relieve fever and toxicity; steroid therapy sometimes induces dramatic remissions, and it has not, in the panel's experience, induced perforation. Dr. Bargen has had good results from X-ray therapy in two to three courses of 600r.

The surgical members of the panel asserted that medical treatment has never effected a cure, but surgery was still to be used only for the complications of the disease—resection was preferred to a bypassing operation. A recurrence-rate of 34% was to be expected, but two-thirds of the patients treated at the Lahey Clinic and the Mount Sinai Hospital have had successful results from surgery. In acute regional enteritis simulating appendicitis, the appendix should not be removed; appendicectomy predisposes to fæcal fistula. Recovery ensues in the majority of these acute cases, which do not necessarily progress to the chronic form. Before attempting to deal with perianal disease, a common complication, it is necessary to correct the intestinal defect. Associated liver disease and carcinoma were regarded by most members of the panel as exceedingly rare.

New Inventions

AN AUTOMATIC CAMERA FOR USE IN OPERATING-THEATRES AND WARDS

THIS automatic camera can provide a day-and-night colour-photographic service in operating-theatre and ward and requires no skilled assistants for its operation. The camera unit is positioned by an unsterile assistant under the direction of the surgeon, who controls by a foot-switch both the camera shutter and the focusing torches, which work on the range-finding or " dam-buster " principle.

Apparatus

The camera unit, made of ' Perspex ', is airtight to enable it to be used during the administration of all types of anæsthetic;

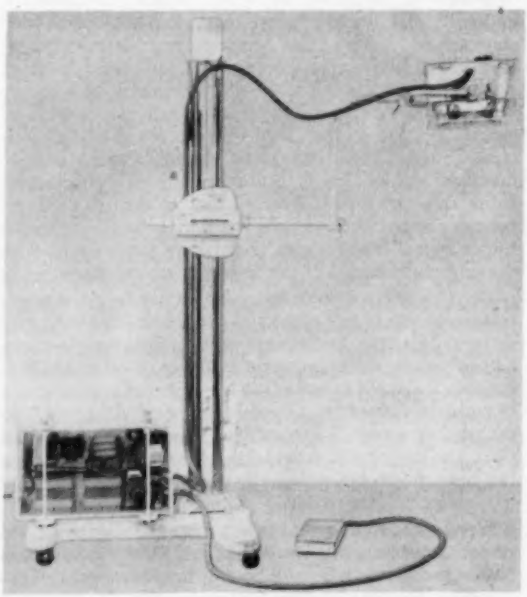

Fig. 1—Automatic theatre camera.

This is mounted on a stand similar to that used by mobile X-ray machines. The camera unit is on an adjustable arm that can be swung over the operating-table. The power pack on the base of the stand acts as a counterweight. The foot-switch has two buttons; one switches on the focusing lights; the other operates the camera shutter.

it includes an electronic flash-tube and two pairs of focusing lights and is mounted on a stand similar to that used in mobile X-ray machines (fig. 1). Mounted also in an airtight box on the stand is the power supply.

The camera is a 'Robot' using 35 mm. film. In this camera film transport and shutter setting are done by clockwork; the foot-switch operates the shutter release through a solenoid (fig. 2). Twenty-four exposures can be made before the camera clockwork has to be rewound.

The telephoto lens covers a field of $4^1/_8$ inches square at the near setting and 8 inches square at the distant setting. Photographs are taken only in these two positions, the desired size of field being selected by manipulating a knob on top of the camera unit.

Each pair of torches is preset and fixed so that their light beams intersect, one pair at the near focus and the other at the distant focus of the camera lens, and illuminate the respective fields covered by the lens at each of these settings (fig. 2). The wiring of the torches is arranged so that the appropriate pair is lit when the "focus" button on the foot-switch is depressed.

To take a photograph during an operation the camera unit is placed above the object, and the surgeon directs its raising or lowering until the focusing beams intersect on the object (fig. 3); he can then take up to 24 photographs simply by pressing the "take" button on the foot-switch.

Illumination for the photograph is provided by a 310-joule electronic flash housed in an airtight reflector and arranged in a circle around the lens (fig. 4). This arrangement gives intense illumination even in deep cavities and allows small lens-apertures to be used. It thus gives a good depth of focus of about 4 inches on the small field and 6 inches on the large.

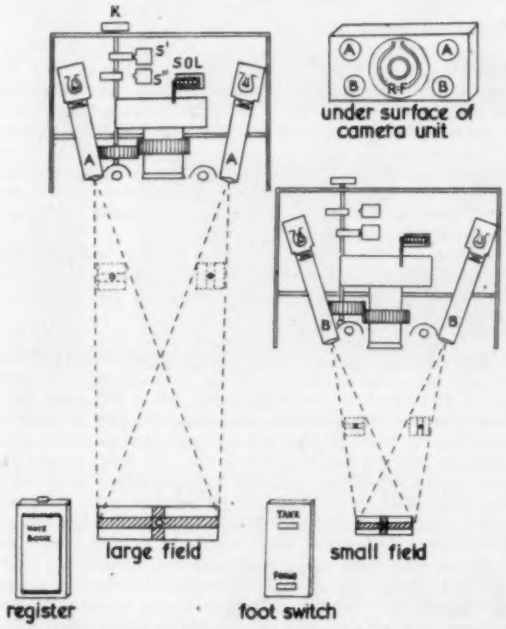

Fig. 2—Construction of camera unit and focusing arrangement for two sizes of field A, torches for large field, B, torches for small field, operated by foot-switch "focus" button; RF, ring flash.

Knob K on top of camera unit adjusts lens focus; at each extreme of this movement switches S^I and S^{II} operate so that appropriate pair of torches are lit when foot-switch button "focus" is depressed. When light beams intersect on object, surgeon depresses foot-switch button "take"; this energises solenoid (SOL) and operates camera shutter. Clockwork mechanism in robot camera transports film and sets shutter for next exposure. Up to 24 consecutive photographs can be taken in this way. To ensure that subject matter of each photograph is recorded a switch is arranged so that apparatus will not work until lid of register has been raised.

An electrical device helps to ensure that details of each patient are entered in the record book kept under a hinged lid on top of the power pack, because when switched on at the mains the machine will not work until this lid has been raised.

Results

Definition is of a high order because of the high optical quality of the lens, and because blurring from movement and vibration is eliminated by the extremely short duration of the flash —12 microseconds. Colour values are constant, and it is not difficult to photograph such objects as the vagus isolated during an abdominal vagotomy.

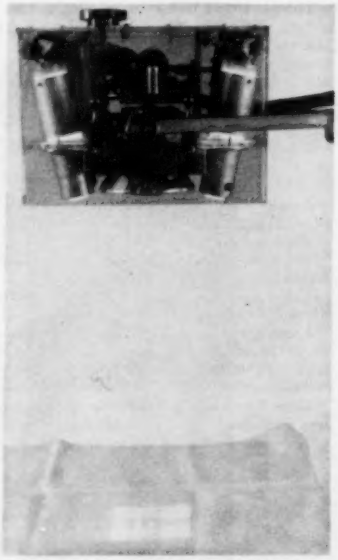

Fig. 3—Torches act as rangefinders and enable camera unit to be placed at correct distance from object.

Each pair of torches is preset and arranged so that their beams intersect, one pair at near focus and other pair at distant focus of lens, and illuminate respective camera fields at each of these settings. Torches are wired so that appropriate pair is lit when "Focus" button on foot-switch is depressed.

Advantages

Other arrangements for automatic photography in the operating-theatre have disadvantages: with cameras in fixed positions, like that of the operating-lamp, it is difficult to arrange for more than one size of photographic field and, unless a flash unit is included, colour photography is impracticable; moreover, such a camera cannot easily be moved to another theatre, ward, or clinic and cannot even easily be used to photograph specimens removed at operation.

Photographic arrangements relying on a photographic technician are invariably subject to delay, and, unless a special gantry is available, it is often impossible for the photographer to reach the best vantage point above the sterile operation field.

The apparatus here described fulfils most of the desiderata and meets both clinical and medicolegal needs in all types of hospital.

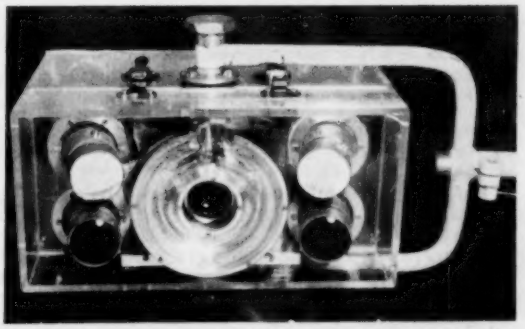

Fig. 4—Undersurface of camera unit, showing two pairs of torches (one pair illuminated) and camera lens surrounded by reflector housing the ring-shaped electronic flash-tube.

The prototype was built by kind permission of Dr. R. G. Macfarlane, F.R.S., in the Nuffield hæmatology workshop, Radcliffe Infirmary, and the apparatus is now in commercial production. I wish to thank Dr. Macfarlane and Dr. F. Kemp for facilities; Mr. E. J. Burrough and Prof. T. P. Kilner for arranging financial assistance; and Mr. A. Lord for building most of the prototype.

SPECIFICATION

Camera.—Robot 2 A. or 'Star.' Negative-size 24 mm. x 24 mm. on 35 mm. colour film ('Kodachrome') (30 exposures on normal 20 exposure length).

Lens.—Schneider 'Tele-Xener' 7·5 cm. Iris diaphram aperture is adjusted automatically to f 14 for near focus and f 11 for distant focus.

Flash.—Ring-type 312-joule (fig. 4).

Torches.—Preset. 48 watts each. Contains lens systems and masks giving beams as shown in fig. 2.

Camera unit and power pack.—Are mounted in airtight 'Perspex' boxes.

Focusing mechanism.—By means of a gear the focusing-knob on top of the camera unit operates the focusing ring on the lens. This is used only at each extreme of its focusing range. In these positions the appropriate pair of torches is brought into circuit.

Servicing.—By releasing four clips the camera, together with the lens and electronic flash tube, can be easily removed from the rest of the camera unit for servicing.

Radcliffe Infirmary, Oxford

A. M. N. GARDNER
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Reviews of Books

Thinking

An Experimental and Social Study. SIR FREDERIC BARTLETT, C.B.E., F.R.S., formerly professor of experimental psychology and director of the psychological laboratory, University of Cambridge. London: Allen & Unwin. 1958. Pp. 203. 18*s.*

So deeply dualistic are our basic assumptions about the nature of human behaviour that the suggestion that the skills of the mind have some features in common with the skills of the body may at first seem bizarre. Sir Frederic, however, not only has been so open-minded as to invent such a hypothesis, but has been ingenious enough to test it. The first chapters report the findings of his experiments on the formal processes of thinking, on interpolation and extrapolation, thinking stepwise and by intuitive jumps. The significance of direction, sequence, and dependence on social background are illustrated. Moving from the laboratory to the field and from "closed" to "adventurous" thinking, later chapters deal with thinking of the experimental scientist, of the artist, and of the man-in-the-street. These activities are delineated with delightful originality and clarity so that many things we have vaguely or confusedly been aware of suddenly jump into focus.

Thinking presents a distillate of years of reflection and investigation in a way which will interest both those pursuing research in the same field, and the rest of us who practise daily, willynilly and as best we may, the very kinds of behaviour described. It is a quarter of a century since Sir Frederic's *Remembering* was published and many of its fruits are still ripening. *Thinking* and also *The Mind at Work and Play* (which preceded it by seven years) will help to mature and extend the already abundant harvest. Sir Frederic has made a splendidly growing and growth-promoting contribution to our understanding of human behaviour.

A Centenary of International Ophthalmology (1857-1957)

Sir STEWART DUKE-ELDER, K.C.V.O., F.R.C.S. London: Henry Kimpton. 1958. Pp. 91. 12*s.* 6*d.*

THE centenary meeting of the International Congress of Ophthalmology is being held this year in Brussels, where the first congress took place. The ophthalmoscope had been demonstrated by Helmholtz in 1850 to the Physical Society in Berlin, and, by allowing the exploration of the inner eye for the first time, completely changed the scope and outlook of the specialty; a new science had been created, the implications of which were of immediate practical importance. But in 1857 it was still not widely known and those who used it were being confronted almost daily by unsuspected clinical pictures which were new and difficult to interpret. It seemed urgent, therefore, to extend the use of the instrument as widely as possible, and equally important that those who were already becoming familiar with it should meet together to collate their observations and agree on their meaning and significance. It was therefore decided to hold an international congress.

Sir Stewart's book tells something of the story of international ophthalmology in all its aspects; and it reflects exciting highlights in the advance of the subject. The salient features of each meeting are briefly described, and most accounts are preceded by a small portrait of the president, including Fallot, von Graefe, Argyll Robertson, Snellen, and Sir Stewart himself. The latter part of the volume deals with the work of the International Council of Ophthalmology, and ends with some wise remarks about the future of the Congress.

Methods in Enzymology

Vol. 4. Editors: S. P. COLOWICK and N. O. KAPLAN. London: Academic Books. 1957. Pp. 914. £8 11*s.* 6*d.*

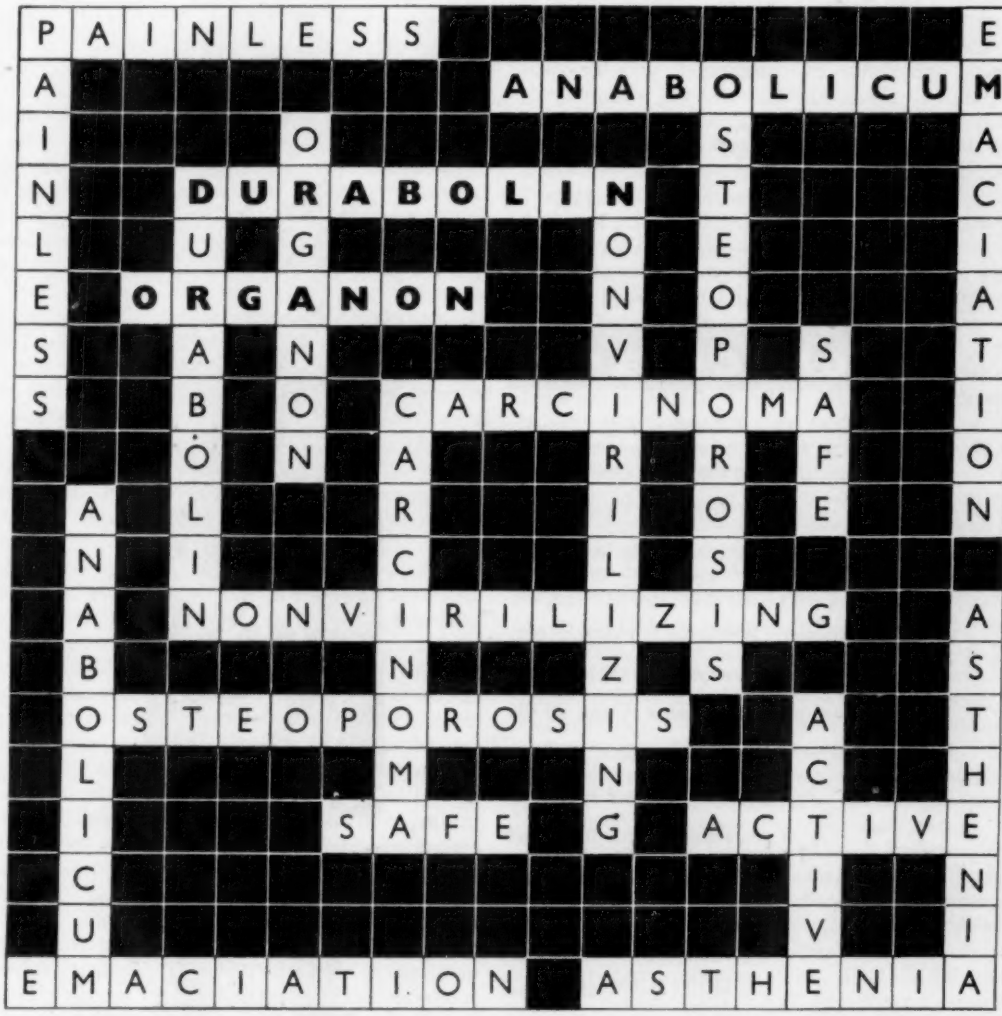
THE final instalment of this ambitious publication maintains the high standard of the preceding volumes. The opening section gives an admirable survey of the principal methods used in the characterisation not only of enzymes but of proteins generally. The first article is on electrophoresis and is by Arne Tiselius himself. The middle section of the book, much the shortest, is a miscellany entitled Techniques for Metabolic Studies. The articles by Britton Chance on spectroscopic observation of respiring cell-particles and that by O. H. Lowry on micromethods of enzyme assay are of outstanding interest. In a contribution on histochemical methods it is disappointing to find not even the briefest general appraisal of this approach to cellular biochemistry. On the other hand, the article by F. S. Sjöstrand on electron microscopy of cellular constituents (unexpected in such a context) is a very valuable review.

The rest of the book is devoted to isotope techniques. Here again the introductory articles (by D. Sternberg and S. Udenfriend on radioactive tracers and by A. San Pietro on stable ones) are admirable. The contributions which follow record radiochemical methods for the synthesis and degradation of compounds important in intermediary metabolism. The article on the isolation of Krebs-cycle intermediates overlaps to some extent one dealing with the same substances (unlabelled) in the third volume, but the rarity of such overlap in a work of some 4000 pages is a tribute to the editors.

Methods in Enzymology provides a valuable starting-point for anyone seeking information on practical problems in this and related fields of biochemistry, and it is also for many purposes a useful bench manual.

Medicine (7th ed. London: J. & A. Churchill. 1958. Pp. 847. 45*s.*).—The preface to the first edition (1932) of Dr. G. E. Beaumont's textbook stated that it was meant as a short text for undergraduates and also as a help to general practitioners. Psychological and dermatological medicine were purposely omitted, but otherwise it aimed to cover briefly the whole field of medicine, which it has successfully done for a long time. Twenty-six years and six editions later, there has been a gigantic expansion of medical knowledge, not merely in the way of discoveries, about which the book is usually up to date and accurate, but in new ways of looking at old facts. Inevitably, in the history of well-established textbooks, points are reached at which more radical revision or reconstruction is required; and perhaps, with the 8th edition ahead, this should now be considered.

The Chemistry of Blood Coagulation (Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1958. Pp. 194. 34*s.*).—This is a translation by Dr. Robert Hartmann of Paul Morawitz's original work which set out the theories of blood coagulation from which our present-day ideas spring. It has considerable historic interest and it is surprising to see that Morawitz was able to quote 490 references. A glossary of terms used by Morawitz, with their equivalents in present nomenclature, is very helpful. The translation is smooth and easy to follow.



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THE LANCET
LONDON 21 JUNE 1958

Agammaglobulinæmia

THE discovery that extreme susceptibility to infection in some patients is related to very low levels of γ-globulin in their serum has opened a field of investigation which is being eagerly explored by physician and immunologist alike. γ-globulin may be separated into several subfractions by electrophoretic and immunological techniques. While one method may fail to reveal any at all, another may show some—presumably because they measure different subfractions. Nevertheless, the term " agammaglobulinæmia " looks and sounds better than the more unwieldy " hypogammaglobulinæmia ". It is already certain that there are various types of agammaglobulinæmia, and a satisfactory classification will depend on further elucidation of the physical, chemical, and immunological properties of the various subfractions. FIRKIN and BLACKBURN [1] have suggested a working classification which will, no doubt, require subsequent modification.

Congenital agammaglobulinæmia was first described by BRUTON [2] in a boy with recurrent bacterial infections. Over 50 cases have now been reported in patients of European extraction [3-9]; this disorder has not so far been recorded in Southern Europe or Latin America. Nearly all the cases are in males, which suggests inheritance as a sex-linked recessive characteristic. This would not exclude an occasional case in females, but the case in a girl reported by PEARCE and PERINPANAYAGAM [10] was almost certainly of a different type because splenomegaly and lymphadenopathy, noted in their patient, have not been reported in boys. Agammaglobulinæmia should be suspected when a young child has repeated bacterial infections in the absence of any other discoverable cause. The γ-globulin level of the serum in such cases varies from 0 to 25 mg. per 100 ml. with different methods of analysis. These children have all shown an apparently normal clinical response to virus infections and to vaccination against smallpox, but virus antibodies are not found in their serum after immunisation against smallpox, poliomyelitis, or other virus antigens or after the virus infections themselves.[6] Bacterial antibodies are not formed on stimulation with bacterial antigens such as T.A.B. vaccine, and the Schick test remains positive after injections of diphtheria prophylactics. Isohæmagglutinins are absent or are present only in extremely low titres. Plasma cells are very scanty in lymph-nodes, bone-marrow, or the inflammatory lesions themselves; this conforms with the view that these cells are the chief source of γ-globulin.[11] The role of the lymphocyte is less certain; much reduction in lymphoid tissue seems to be a constant finding, but lymphopenia has not always been observed. Neutropenia and eosinopenia are common.[6] GOOD [12] reported successful skin homografts to 2 patients with congenital agammaglobulinæmia, and long survival of a skin transplant in a hypogammaglobulinæmic adult. Normally this is only possible between identical twins, because in other individuals antibody-production kills the transplants. Transplants of skin from agammaglobulinæmic patients to normal persons fail, the rejection being associated with plasmocytosis in the skin and regional lymph-nodes. The recurring bacterial infections in these young children usually yield rapidly to antibiotics, and they may be prevented by regular injections of γ-globulin [3] with or without protracted antibiotic prophylaxis.

Primary acquired agammaglobulinæmia may be diagnosed in patients of either sex in whom recurrent bacterial infections start after early childhood, and in whom the γ-globulin level of the serum is below 100 mg. per 100 ml. without other discoverable cause. The deficiency of γ-globulin tends to be less complete than in the congenital disease; immunoglobulins and isohæmagglutinins tend to be formed rather better; and there may be bacterial antibody formation to some antigens but not to most. Enlargement of the spleen and lymph-nodes is common.[13-15] Several patients have been shown to have steatorrhœa, and others have presented with bronchiectasis.[5 15-17] Leucopenia is common and has in some cases been relieved by splenectomy.[5 14] Deficiency of plasma cells is a notable feature, as in the congenital cases.[5 14] FIRKIN and BLACKBURN [1] have suggested that the acquired condition may be classified into three subgroups according to whether the lymph-nodes show (1) absence of germinal centres, (2) " benign " follicular hyperplasia, or (3) replacement of normal architecture by granulomatous tissue. In fact, they have suggested that the disease may represent a mild form of reticulosis, which would make their division of acquired agammaglobulinæmia into primary and secondary forms somewhat unreal. On the other hand, CITRON [14] found hypergammaglobulinæmia in relatives of each sex of his 2 patients. YOUNG et al.[18] recorded the same finding in the healthy mother and brother of a man with agammaglobulinæmia. This suggests that genetic factors may play a part even in the acquired form of agammaglobulinæmia.

The behaviour of tuberculous infections in both the congenital and the acquired forms of primary agammaglobulinæmia contrasts strikingly with that of other bacterial infections. Clinically, the acquired immune response to tuberculous infection seems to function normally in the absence of γ-globulin.[19] It might have been expected that such patients would not show

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3. Janeway, C. A., Apt, L., Gitlin, D. *Trans. Ass. Amer. Phycns*, 1953, **66**, 200.
4. Hayles, A. B., Stickler, G. B., McKenzie, B. F. *Pediatrics*, 1954, **14**, 449.
5. Good, R. A., Mazzitello, W. F. *Dis. Chest*, 1956, **29**, 9.
6. Good, R. A., Zak, S. J. *Pediatrics*, 1956, **18**, 109.
7. Hutchison, J. H. *Lancet*, 1955, ii, 844.
8. Elphinstone, R. H., Wickes, I. G., Anderson, A. B. *Brit. med. J.* 1956, ii, 336.
9. Bird, T., Thomson, J. *Lancet*, 1957, i, 59.
10. Pearce, K. M., Perinpanayagam, M. S. *Arch Dis. Childh.* 1957, **32**, 422.
11. Sundberg, R. D. *Ann. N.Y. Acad. Sci.*, 1955, **59**, 671.
12. Good, R. A. *Amer. J. Dis. Child.* 1955, **90**, 577.
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14. Citron, K. M. *Brit. med. J.* 1957, i, 1148.
15. Cook, I. A., Melrose, A. G. *Scott. med. J.* 1958, **3**, 135.
16. Sanford, J. P., Favour, C. B., Tribeman, M. S. *New Engl. J. Med.* 1954, **250**, 1027.
17. Cooke, W. T., Weiner, W., Shinton, N. K. *Brit. med. J.* 1957, i, 1151.
18. Young, I. I., Wolfson, W. Q., Cohn, C. *Amer. J. Med.* 1955, **19**, 222.
19. Parkes, R. *Brit. med. J.* April 26, 1958, p. 973.

delayed tuberculin hypersensitivity. But one of the agammaglobulinæmic brothers described by ELPHINSTONE et al.[8] had primary intrathoracic tuberculosis with a positive Mantoux test; his disease ran a normal course, recovery being hastened by chemotherapy; his sibling reacted normally to B.C.G., with subsequent Mantoux conversion. PARKES [19] has described the case of a woman with acquired agammaglobulinæmia who had sputum-positive pulmonary tuberculosis and a positive Mantoux test; her clinical course seemed to be no different from that of others, but she had repeated severe pyogenic infections. Furthermore, delayed hypersensitivity to tuberculin has been produced in a hypogammaglobulinæmic patient by subcutaneous homograft of lymph-node from a sensitised donor.[20] Immunologically tuberculosis behaves quite differently from other bacterial infections.

In contrast, there is evidence that agammaglobulinæmic patients may be highly susceptible to protozoan infections. In 1955 HUTCHISON [7] reported the first case of congenital agammaglobulinæmia in this country. The pneumonia which caused the death of this patient, a boy aged 1 year and 8 months, comprised bilateral massive consolidation with a peculiar intra-alveolar acellular exudate and greatly thickened alveolar walls due to infiltration of round cells, a few polymorphs, and some macrophages; no plasma cells were recognised in the interstitial infiltrate. Five years previously this child's brother had died at the age of 6 months of an identical type of pneumonia, and it seemed probable that he had had unrecognised agammaglobulinæmia. HUTCHISON [21] subsequently reported that H. S. BAAR had pointed out to him that the cause of the pneumonia in both siblings was infection with *Pneomocystis carinii*. This protozoan infection is commonly described, under the name "interstitial plasma-cell pneumonia", in young infants in Central Europe, but it has only very rarely been described in this country. No doubt the absence of plasma cells in HUTCHISON's cases was due to the agammaglobulinæmia. Last year BIRD and THOMSON [9] described 2 further fatal cases of *Pneumocystis carinii* pneumonia in male infants, 1 of whom had been shown to be agammaglobulinæmic. The lung sections in these cases showed appearances identical with those found in HUTCHISON's cases, including absence of plasma cells, and probably both infants had congenital agammaglobulinæmia. *Pneumocystis carinii* infection does not respond to antibiotics. Its presence should be suspected in any infant or child with an antibiotic-resistant pneumonia, and the level of the γ-globulin in his serum should be estimated.

Secondary acquired agammaglobulinæmia has been described in various disorders of the reticulo-endothelial system such as myelomatosis, lymphoma, and chronic lymphatic leukæmia.[1] Some but not all of these patients are unduly susceptible to bacterial infections.

Transient hypogammaglobulinæmia of infancy is physiological, in that the level drops in the 1st month of life to a third of the value at birth. It starts to rise again about the 3rd month, but the adult value is not reached until the age of 2 years.[22] GOOD [12] has studied a woman with acquired agammaglobulinæmia during pregnancy. In the first trimester she failed to respond to antigenic stimulation, but a significant response occurred during the last thirty days. After delivery of the fœtus and placenta the immune response in the mother was no longer demonstrable. The child was agammaglobulinæmic in the first 2 months of life. During the 3rd month the infant began to produce γ-globulin, to make antibody, and to show plasma cells in the reticulo-endothelial tissues. In some instances the low level of γ-globulin may persist longer and be associated with infections. 4 fatal cases which were probably in this category were associated, not with bacterial or protozoan infections, but with vaccinia gangrenosa.[23–25] The pathological findings have also differed from those in congenital agammaglobulinæmia in that although, as in the latter, lymphoid tissue is diminished with a notable reduction in germinal centres, plasma cells and monocytes may be numerous. Furthermore, 1 of these patients was a female infant.[23] It seems that some of the very young infants with "interstitial plasma-cell pneumonia" ascribed to *Pneumocystis carinii* in Continental reports may have had this type of hypogammaglobulinæmia.

FIRKIN and BLACKBURN [1] include two other much less clearly defined categories in their classification. Hypogammaglobulinæmia associated with hypoproteinæmia is most often seen in the nephrotic syndrome, but there remains an ill-defined group of patients with hypoproteinæmia and low γ-globulin level who present with episodic œdema but rarely with infections. Hypogammaglobulinæmia with the familial dysproteinæmia of Homburger is characterised by familial œdema of the legs, ulcers of the legs in males, and functional vascular changes in females. Dysproteinæmia may be detected only by electrophoresis and may vary from one relative to another.

20. Martin, C. M., Waite, J. B., McCullough, N. B. *J. clin. Invest.* 1957, **36**, 405.
21. Hutchison, J. H. *Lancet*, 1955, ii, 1196.
22. Orlandini, O., Sass-Korstak, A., Ebbs, J. H. *Pediatrics*, 1955, **16**, 575.
23. Keidan, S. E., McCarthy, K., Haworth, J. C. *Arch. Dis. Childh.* 1953, **28**, 110.
24. Kozinn, P. J., Sigel, M. M., Gorrie, R. *Pediatrics*, 1955, **16**, 600.
25. Somers, K. *Arch. Dis. Childh.* 1957, **32**, 220.

Local-authority Dental Services

THE reports of medical officers of health and school medical officers are beginning to make their annual appearance, and almost without exception they draw attention to serious understaffing of the dental services. Over the country as a whole, there are now no more local-authority dentists than there were before the war, prospects for development are definitely not bright, and there seems to be little hope of the present maternity and child-welfare and school dental services evolving to become a nation-wide comprehensive service. It would be incorrect, however, to conclude that all parts of the country are suffering equally, or even to assume that, because the local-authority service in one locality happens to be well staffed, the priority classes there are necessarily much better provided with dental

care than in areas where shortage of staff exists. The quality and quantity of dental attention that the children and expectant and nursing mothers of a given area receive is nowadays increasingly a function not only of the number of full-time dentists employed by the local authority but also of the number of dentists in the National Health Service who regularly treat children and the proportion of their time they are willing to reserve for the priority groups. In areas where there are few local-authority dentists but relatively many private practitioners treating the priority classes, it is possible for the latter group to compensate for the deficiency in the former.

The wide discrepancies in resources between one area and another cannot be justified, and a survey of the overall position seems to be the essential next step. By correlating the number of local-authority dentists in each area, the number of private dentists regularly treating the priority classes under the National Health Service, and the proportion of their time devoted to this work with the size of the local population, it should be possible to identify the "black areas" in which facilities are inadequate. Such an inquiry could be carried out for the Ministries of Education and Health, which could then try, in cooperation with the local authorities concerned, to redress the balance by stimulating recruitment of local-authority dentists into these areas, perhaps by the offer of houses and perhaps also by "weighting" the national salary-scale in favour of otherwise unattractive parts of the country. Such a policy would probably entail the abandonment, for the time being, of national recruitment and competition between the local authorities for the services of the relatively few dentists attracted to salaried posts, in favour of an attempt to persuade those members of the profession willing to enter or already in the local-authority service to move to areas where the need for their services is greatest. If successful, this measure would at least result in a more equitable distribution of limited numbers. Its effects could be enhanced if, in addition, National Health Service dentists could be persuaded to devote more of their time to young children, perhaps by payment of a special bonus to practitioners in the "black areas" who were willing to give regular comprehensive treatment to a certain number of children each year.

It seems quite unrealistic to hope to build up a comprehensive service for the priority groups on the basis of the few dentists at present attracted to appointments under the local authorities, and the most urgent problem is to ensure that those who do take such appointments go to areas where they are most needed.

Annotations

INTERNIST INTO INTERNATIONALIST

LAST week in London Prof. Howard Rusk of New York described how the war changed some of his ideas on what matters most in medicine. He was giving the third Horder lecture, founded by the British Spas Federation; and Prof. R. E. Tunbridge, chairman of the Federation, presided over an audience which included the Minister of Health.

Before 1942 Dr. Rusk was an internist in Missouri, and he came of the school of thought which sets most store by the intricacies of diagnosis. Having hitherto regarded convalescence as something hardly worth bothering about, he suddenly found himself organising an Air Force rehabilitation centre. He was impressed first by the appalling amount of time wasted in hospital by Service patients who ought to have been actively prepared for the quickest possible return to military duty. In attempts to remedy this, various trials proved the advantages of early ambulation. This was not a new discovery, for it had been recommended by a gynæcologist to his scornful colleagues of the New York Academy of Medicine in 1905. Nearly forty years after this pioneer was suppressed by the critics, "we began to learn", Dr. Rusk said, "that rest in bed ought not to be used indiscriminately and could be dangerous". Merely going to bed, it was found, produced negative nitrogen and calcium balances and reduced cardiovascular efficiency.

From this work his attention turned to the restoration of the men with permanent disabilities. At the end of the first world war, less than 10% of the U.S. 400 paralysed soldiers and sailors survived to need rehabilitation; but after the second war there were 2500 of them—strong young men, with good heads and hands, who wanted to do the best they could with the rest of their lives. Thanks to an active programme, parallel to the British one centred on Stoke Mandeville, 1763 of these men are now living at home and driving their own cars, and 1400 are doing some kind of work.

But if this could be done for Servicemen, why should it not be done for the civilian, of whom there were some 12,500 paralysed during the same period? Why should a distinction be made between the wounded in war and the wounded at home—disabled in industry or automobile accidents? In the ten days after D-day in Normandy, the American Forces had 11,000 killed and wounded; but in the same ten days no fewer than 26,000 were killed and wounded on the highways and in the factories of their own country. To give the same chances to the civilian disabled as to the soldiers, much leeway had to be made up and much work was needed: of hemiplegics alone, the number in the U.S.A. is put at 1,400,000. But what can be done by active treatment is shown by the fact that of 3000 hemiplegics (of average age 63) 88% were able, within nine months, to cope with the needs of daily life at home, and 40% were in gainful work. For patients to do well, Dr. Rusk found they needed three things—someone to love them, a home to go to, and a job to go to.

Lord Horder, he said, was one of the first to become interested in this new yet old specialty of rehabilitation, and in his original address to the Chartered Society of Physiotherapists he had put the emphasis not on passive methods of treatment but on getting patients to do things for themselves. He used stress as a therapeutic friend; and Dr. Rusk, too, holds that stress, in the sense of something that forces activity, is necessary for recovery and for a happy life. If the stresses of work are suddenly removed on retirement at 65, the result may be disastrous; so old people should continue to have jobs of one kind or another, though not necessarily their old ones. They need above all an object, and he had seen astonishing results in a club formed for over-65s—people without anywhere to go. This club has committees for everything (one committee to serve the tea and another to serve the coffee); there are bridge-drives and dances and weddings; and,

while the hospital admissions of these old people for physical illness have fallen by half, their admission for senile psychosis has actually ceased. This, said Dr. Rusk, is real preventive medicine—the preventive medicine of the future. Though he admitted that it was unscientific to say so, he believes that a purpose in life, and being happy, does something to prevent the progression of arteriosclerosis.

Having just returned from an international conference called by the International Labour Office to discuss rehabilitation of the disabled workers, Dr. Rusk ended his lecture by endorsing the plea of a Russian representative that against disability we should all work together. He has never, he said, been anywhere in the world where doctors—regardless of race, creed, colour, politics, and curtains—do not have a common language and a common purpose. In the healing arts we have a tremendous responsibility and also a tremendous opportunity. In this world that is so technologically precocious and spiritually adolescent we can, if we try, build at least one block of international understanding.

SMOKING AND PAPILLOMA OF THE URINARY BLADDER

IN Denmark Clemmesen et al.[1] investigated the smoking habits of patients with papilloma of the urinary bladder, and they conclude that among men with this disease there is a lower proportion of non-smokers than there is among the healthy, and that, where patients smoke only one type of tobacco preparation, cigarettes, cigars, and cigarillos are implicated, but not pipe-smoking. They noted that admission to hospitals in Copenhagen of patients with papilloma of the bladder had increased steadily from the three-year period 1944–46 up till the period 1953–55. The numbers were respectively 22 and 110 in men and 4 and 40 in women. From information previously gained from the Danish Cancer Register it is stated that the increase in incidence of bladder tumours, both benign and malignant, has occurred in men but not in women and follows closely that of bronchial cancer—though this is not borne out by the hospital figures cited in their report. Clemmesen et al. questioned patients still alive between March, 1956, and November, 1957, about their smoking habits and compared the information thus gained with similar information from healthy persons obtained for another purpose in 1952–53. But 153 patients (more than a third) were not interviewed on account of lack of response (31) or death or inability to trace their whereabouts (122).

Lilienfeld et al.[2] suggested provisionally, from a retrospective survey of clinical records of patients admitted to hospital with urinary-bladder cancer, that a significantly larger proportion of the men had smoked cigarettes for longer than had other classes of patients chosen for comparison; no such association was found in women. Holsti and Ermala [3] swabbed the lips and oral cavities of mice with tobacco tar for 140 days and reported that they had observed both benign and malignant papillomatosis of the bladder at the end of a year of observation. But no confirmation of this finding has been described.

An association between papilloma and cancer of the bladder on the one hand and the manufacture, purification, and usage of certain aromatic amines on the other is well established in every country where such an industry exists. In the future it should be possible to predict with some degree of certainty that certain chemicals are likely to be carcinogenic, but it will be far more difficult to tell which will be non-carcinogenic. The risk is not confined to the aromatic intermediates from which dyes are made: the finished dyes may also be carcinogenic, especially the azo compounds; and some of these, or their close chemical relatives, are in use as food dyes in some countries. The exogenous causes of bladder papilloma and cancer is receiving concentrated investigation; and in this chemical age it is to be expected that the incidence will rise for reasons unconnected with tobacco smoking.

1. Clemmesen, J., Lockwood, K., Nielsen, A. *Danish med. Bull.* 1958, **5**, 121.
2. Lilienfeld, A., Levin, M., Moore, G. *Arch. intern. med.* 1956, **98**, 129.
3. Holsti, L., Ermala, P. *Cancer*, 1955, **8**, 679.

THE CURE OF SOULS AND BODIES

FROM earliest times the Churches have shared with doctors the responsibility for the care of the sick, and the origins of many of our oldest hospitals show the value and strength of this ancient alliance. But with the growth of scientific medicine, the partnership became uneasy. The doctor was less ready to share with the priest the responsibility for his patients. Today he is becoming increasingly aware of the effect of the patient on the disease and of the need to treat the person rather than the case. This shift of emphasis has led many doctors to reconsider their attitude. The Church of England [1] and the Church of Scotland [2] have also been considering their duties and responsibilities towards the sick in the modern world, and in the reports which Commissions of both churches have lately presented the thoughtful doctor will perhaps find a form of contract for a new and firmer partnership.

Both Commissions are reserved in their attitude towards medically inexplicable healings. Though they do not deny that these may occur they recognise that so-called miracles may be acclaimed in good faith by the layman who, unlike the doctor, is unaware of the normal course of a disease and possible natural remissions. The Anglican Commission, which acknowledge the help they received from a committee of the British Medical Association,[3] wisely point out that many people are too ready to admire the unusual, and too slow to recognise the wonder of the familiar. They regret " the popular idea that what can be scientifically explained has little or nothing to do with God ". The Scottish Commission insist that " problems affecting physical and mental health require consideration *first* by a physician " and that spiritual healing should only be used with great discretion and always in consultation with the patient's doctor.

The Anglican Commission suggest that the rigid separation of the spiritual and physical " which has, without doubt, enabled medicine (as much as other sciences) to make progress " has now outlived its usefulness, and both Commissions believe that the patient would now gain by closer cooperation between the churches and the doctors. Doctor and priest, the Anglican Commission hold, need to respect each other's skill and understand the purpose of each other's work, and this will not be achieved by

1. The Church's Ministry of Healing. 1958. Pp. 84. 2*s.* 6*d.* Obtainable from the Church Information Board, Church House, Westminster, S.W.1. The medical members of the Archbishops' Commission were: Mr. E. S. Brentnall, Dr. Denis Brinton, Dr. Ronald Cove-Smith, Dr. J. A. Hadfield, Dr. R. A. Henson, Lady Jefferson, Prof. Alan Moncrieff, Sir James Paterson Ross, Dr. Joy Patrick, and Dr. David Stafford-Clark.
2. Report of the Commission on Spiritual Healing. 1958. Obtainable from the Publications Department, Church of Scotland, 121, George Street, Edinburgh, 2. The medical members of the Church of Scotland's Commission were: Dr. W. A. Alexander, Prof. Stanley Alstead, Sir David Henderson, Dr. G. W. Ireland, Dr. Marjorie Keith, and Mr. G. H. Stevenson.
3. Divine Healing and Cooperation between Doctors and Clergy. London, 1956.

keeping out of each other's way. Consultation over individual patients is the easiest and most natural way to draw priest and doctor together, but both Commissions suggest that this could be extended by meetings between small groups of clergy and doctors to exchange views and experiences. They also propose that medical and theological students should be given an opportunity of learning something of the work and responsibilities of each other's profession. The Scottish Commission was able to report that in at least one of their theological colleges a course of lectures is given to final-year students by the medical superintendent of a mental hospital and that the students visit the wards of the hospital. Another opportunity for cooperation which the Scottish Commission urge is in hospitals with chaplains. They would like to see the chaplain treated as a recognised member of the staff and drawn more often into consultation with his medical colleagues.

In their training and approach the doctor and the priest inevitably differ. But they share a common concern for the patient, and when a patient seeks help from both it will be most effectively given by colleagues who respect and trust each other.

ANTICHOLINESTERASE INHIBITORS

THE anticholinesterases commonly used in the diagnosis and treatment of myasthenia gravis are neostigmine, pyridostigmine, and edrophonium. Less commonly used are organophosphorous compounds with powerful anticholinesterase activity—di-isopropyl fluorophosphate and tetraethyl pyrophosphate. Overdosage of an anticholinesterase may lead to a " cholinergic crisis " due to accumulation of acetylcholine in the tissues. This stage is often difficult to recognise. Clinical deterioration after an intravenous dose of edrophonium is evidence of the cholinergic state; and, because of the drug's transient action, this test is fairly safe. Until recently there was no specific therapy for anticholinesterase poisoning. The main weapons were withdrawal of neostigmine and administration of atropine, which neutralises the gastrointestinal, bronchial, and cardiac effects. A free airway must be maintained, and sometimes mechanical aids to respiration are necessary. *d*-Tubocurarine has been recommended [1]; but the dose needed for " competitive blocking " of anticholinesterase is uncomfortably close to that producing muscular paralysis. The action in man of two specific anticholinesterase inhibitors has now been thoroughly studied by Grob and Johns.[2]

These substances are pyridine-2-aldoxine (2-P.A.M.) and diacetyl monoxine (D.A.M.). They were found to reverse cholinesterase inhibition and neuromuscular block due to organophosphorous or quaternary ammonium anticholinesterases. 2-P.A.M. proved the better of the two when administered before or after other anticholinesterases. A very large dose of 2-P.A.M. can produce a neuromuscular block in animals, but in man the recommended dose—1–2 g. intravenously—is unlikely to have this effect. Clearly 2-P.A.M. should now be held ready for emergency therapy in cholinergic crises. Unfortunately at this serious stage many myasthenics are in a precarious balance between the progressive disease and high neostigmine dosage; thus, whatever treatment is applied, many may fail to recover. Namba and Hiraki [3] found that these two substances also counteracted ' Parathion ', an organophosphorous insecticide which sometimes gives rise to accidental poisoning.

1. Churchill-Davidson, H. C., Richardson, A. T. *Lancet*, 1957, i, 1221.
2. Grob, D., Johns, R. J. *Amer. J. Med.* 1958, **24**, 497, 512.
3. Namba, T., Hiraki, K. *J. Amer. med. Ass.* 1958, **168**, 1834.

A NEW HOSPITAL REGION

THE South West Metropolitan Regional Hospital Board, responsible for a vast straggling area and a population of nearly 5 million, has deliberately fostered partial autonomy in its most distant sector—that of Wessex (Hampshire, Dorset, Wiltshire, and the Isle of Wight). The Minister of Health has now announced that the autonomy is to be complete from April 1 next year, when a Wessex Regional Hospital Board will come into operation. The new region, which is compact, contains about $1^3/_4$ million people; and in it every specialty except neurosurgery is already covered. If Southampton were eventually to have a medical school, this might end the region's reliance on London; but meanwhile it is likely to continue its association with the University of London—notably the British Postgraduate Medical Federation and the three undergraduate teaching hospitals (St. George's, St. Thomas's, and Westminster) that are linked with the South West Metropolitan region.

Ten years ago a Wessex hospital region would have had to rely on London for many specialties. Today that is no longer so. The fact that the new region will from the start be so largely self-reliant testifies to the remarkable improvement, during the past decade, in hospital services outside the capital.

ANTIBODY FORMATION IN VITRO

THE mechanism by which antibodies are formed is not completely understood, but it has been found that lymph-nodes transplanted from an immunised animal to a normal animal continue to produce antibody in the new host. Washed cells from the lymph-nodes of an immunised rabbit give rise to antibodies when injected intravenously into a normal rabbit.[1] Antibody formation also occurs in vitro in cultures of various tissues removed from immunised animals.[2 3] Some interesting experiments which carry the matter a stage further are now reported [4] by Dr. Nossal and Professor Lederberg, well known for his work on bacterial genetics in the University of Wisconsin, who has been the Fulbright visiting professor in Melbourne.

Rats were each immunised with two different strains of salmonella and the popliteal lymph-nodes were excised. Cell suspensions were prepared from these lymph-nodes, and by micromanipulation methods single cells were isolated. Some of these single cells when incubated in a serum-saline medium produced antiflagellar antibodies capable of immobilising one or other of the bacterial strains with which the rats had been immunised.

Quite apart from the interesting possibility of demonstrating antibody formation in vitro by single cells, this achievement makes it possible to investigate various problems of antibody formation. The two salmonella strains used had different specific flagellar antigens, and the rats produced two distinct antibodies each capable of immobilising the specific strain. The question arises therefore whether the two kinds of antibody are produced by a single cell or whether a separate cell is necessary to produce each kind of antibody. In the experiments reported, 456 single cells were tested for antibody production, and of these 33 were active against *Salmonella adelaide* and 29 against *Salmonella typhi*, but none of these 62 immobilised both strains. Possibly some cells may have

1. Harris, S., Harris, T. N., Farber, M. B. *J. Immunol.* 1954, **72**, 148.
2. Fagreus, A. *ibid.* 1948, **58**, 1.
3. Keunig, F. J., van der Slekke, L. B. *J. Lab. clin. Med.* 1950, **36**, 167.
4. Nossal, G. J. V., Lederberg, J. *Nature, Lond.* 1958, **181**, 1419.

produced a very small amount of the second antibody in addition to the predominantly large amount of the main antibody; but the conclusion seems valid that " when an animal is stimulated with two contrasting antigens, individual cells tend to form one species of antibody ". There remains the problem of why this is so. Is it an interference phenomenon, and can a cell deal with only a single antigen at a time? Or is a cell genetically restricted to the kind of antigen to which it can form antibodies? In order to answer such questions it may be necessary to go back to a previous stage in the process—that of the initial stimulus to antibody formation.

ARTIFICIAL RESPIRATION

IT has been proposed that an old method for artificial respiration, and a variant of it, should be used for emergency resuscitation. Safar et al.[1] maintain that, used properly, mouth-to-mouth insufflation is far better than any of the push-pull methods: certainly the figures given for the ventilation achieved suggest that their technique is efficient. They criticise the method originally used for testing and comparing the different manual methods of artificial respiration. They point out that in all instances the patients, though anæsthetised and curarised, were also intubated, thus ensuring a clear airway. When they tested methods such as the arm-lift/back pressure (Holger-Nielsen) on patients who were not intubated the volume per respiration was low—not much above that which would wash out the dead space. Without intubation, and even in the prone position, the toneless soft palate and pharynx partly block the airway and severely limit possible ventilation. Even with intubation Safar et al. did not succeed in moving more than 700–260 c.cm. of air with either the Holger-Nielsen or the Silvester method. This is far below the ventilation regularly attained in the investigation of Gordon et al.,[2] but the reason for this difference is not clear.

Safar et al. tested the mouth-to-mouth method with the subject on a hard table and on the floor. They point out that one advantage of the method is that the operator has both hands free to hold the lower jaw forward and to keep the mouth open, thus ensuring a clear airway; at the same time the hands can be used to close the patient's nostrils. The operator places his own mouth well over that of the patient and, at first vigorously, and later less vigorously, blows out his own expired air until the patient's chest expands. The operator then removes his mouth and allows expiration to occur naturally by elastic recoil. It is claimed that this method can be used by anyone on anyone, that it can be maintained for long periods without fatigue or dizziness, that it easily achieves a ventilation of 1000–1500 c.cm. at 12–20 respirations a minute, and finally that it is easily taught and learnt. Occasionally air may enter the patient's stomach; but it can be removed by compression of the abdomen, and it does not interfere with the respiratory process. The main objection to the mouth-to-mouth method is æsthetic, and to overcome this Safar et al. have designed a simple S-shaped tube which can rapidly be inserted down to the pharynx; the operator can then expire through the outer end of this tube, giving oropharyngeal respiration. The ventilation by using the tube is just as good as in the direct mouth-to-mouth method. Insertion of the tube is said to be easy, to be soon learnt, and to involve negligible delay in starting resuscitation. Further, the tube is small and light and can easily be carried in the pocket. Mouth-to-mouth resuscitation can be used on patients of all ages, but Safar et al. emphasise that for infants the operator must not expire vigorously lest he rupture alveoli; little more than an expiratory puff is required.

Safar et al. state that they tried the Holger-Nielsen method after inserting their pharyngeal tube and found that ventilation was extremely poor unless the lower jaw was held forward—obviously an impossible manœuvre for a rescuer working single-handed. It is difficult to reconcile this and some other criticisms of the Holger-Nielsen and Silvester methods with the successes known to have followed their use,[3] and even that of the far less efficient Schäfer method. It is also difficult to see how dizziness is avoided if the operator is hyperventilating sufficiently to supply "virtually room air" to the patient. If the operator does not hyperventilate the method is open to objection by those who believe that 4–5% CO_2 should not be supplied to one who is anoxic and probably hypercapnic. Nevertheless, though most people cannot be expected always to carry an oropharyngeal tube and must therefore stick to the Silvester or Holger-Nielsen methods, all workers who are likely to be faced by emergencies might well learn and test this simple method, and, if they find it good, use it. All the speakers in an American Symposium on this method[4] spoke favourably of it. Certainly no unreasonable conservatism should be allowed to prevent progress in saving life or preventing that death in life—the decerebrate state resulting from anoxia.

BIRTHDAY HONOURS

THE award of the Order of Merit to Sir Macfarlane Burnet, the distinguished virologist and immunologist, will be widely and warmly welcomed. Burnet graduated in medicine in the University of Melbourne, where he is now director of the Walter and Eliza Hall Institute of Medical Research; and he devoted two periods to study and research in this country, in 1926–27 at the Lister Institute and in 1932–33 at the National Institute for Medical Research at Hampstead. But he has spent most of his life, in biological and medical research of one kind or another, in Melbourne, where he has built a school which attracts workers from all over the world. He has done much fundamental work on bacteriophages, and recently he has made equally detailed researches into the influenza viruses, and their methods of penetrating cells and multiplying therein. In these two fields he has profoundly influenced scientific thought. He is probably better known, however, for his ability to generalise in matters of wide biological significance.

Doctors in the Dominions figure prominently elsewhere in the Honours List. Thus Dr. C. R. Burns and Prof. F. H. Smirk, of New Zealand, are appointed K.B.E.; and Prof. J. C. Eccles, Mr. B. T. Edye, and Brigadier K. B. Fraser, of Australia, and Colonel A. G. Curphey, of Jamaica, are created knights. Of the honours to doctors in this country, the appointment of Mr. J. D. McLaggan as K.C.V.O. and the knighthood conferred on Brigadier J. S. K. Boyd and Mr. E. W. Riches will give special pleasure to many. We congratulate these and the others named in the list on p. 1332.

Sir ARNOLD STOTT, consulting physician to the Westminster Hospital, died at his home in Surrey on June 15 at the age of 72.

1. Safar, P., Lourdes, A. E., Elam, J. O. *New Engl. J. Med.* 1958, **258**, 671.
2. Gordon, A. S., Raymon, F., Sadove, M., Ivy, A. C. *J. Amer. med. Ass.* 1950, **144**, 1447.
3. See *Lancet*, 1952, i, 548.
4. *J. Amer. med. Ass.* 1958, **167**, 317–341.

Public Health

OUTBREAK OF POLIOMYELITIS IN A SMALL URBAN COMMUNITY

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POLIOMYELITIS broke out in Brightlingsea (population about 4500) in the spring of 1957, 46 cases being notified in seventeen weeks, and 40 of these being subsequently confirmed clinically (table I).

Brightlingsea, an east-coast yachting centre, is situated on the eastern side of the Colne estuary in East Essex. The two main industries are the building of small ships and boats and the oyster fisheries.

Originally the town was probably an island. Today it is served by one road three miles long, which connects Brightlingsea with the Colchester–Clacton Road, B1027. A single railway line connects the town with the main Clacton line. The surrounding countryside is agricultural, and therefore a small urban community exists. Most of the inhabitants work

TABLE I—AGE-GROUPS AFFECTED

Age (yr)	Paralytic		Non-paralytic	
	Male	Female	Male	Female
1–2	1	1	..	1
3	2	1	1	2
4	3	..	2	2
5–9	8	4	2	1
10–14	..	..	..	2
15–24	1	..	..	1
25 or more ..	2	1	..	2
Total ..	17	7	5	11

in the town, but an increasing number work in a large town about nine miles distant. The accompanying map shows the relations of Brightlingsea.

So far as it is possible to ascertain, there had never been a notified case of poliomyelitis in Brightlingsea until the autumn of 1952, when 2 patients with paralytic poliomyelitis were admitted to hospital. In the autumn of 1954 8 patients with non-paralytic and 6 with paralytic poliomyelitis were admitted to hospital. In October, 1955, 6 cases of non-paralytic poliomyelitis were notified, and from the records it appears that none of these patients was admitted to hospital. At that time, however, there were several cases of aseptic meningitis in the surrounding districts; therefore, although the diagnosis of these 6 cases must remain in doubt, it is likely that they were cases, not of poliomyelitis, but of aseptic meningitis. In January, 1956, a girl, aged 18, who worked out of Brightlingsea contracted paralytic poliomyelitis. No other cases were notified during the year.

At the end of January, 1957, a boy, aged $4^1/_2$ years, with symptoms suggesting poliomyelitis, was seen by his general practitioner and was subsequently admitted to hospital and diagnosed as having paralytic poliomyelitis. No other case of poliomyelitis was known to exist at that time in East Essex. The boy's father worked as a porter on a main-line station. Neither the boy's father nor his mother had any illness. The boy was discharged from hospital on March 14, 1957. On March 16 2 more cases of poliomyelitis were notified, and from then until the beginning of June there were 37 further confirmed cases.

The Brightlingsea epidemic was the first phase of a widespread outbreak of poliomyelitis which later extended north-west to Colchester and the surrounding villages. Some centres of population to the east had very few cases, and one centre escaped the epidemic entirely. The average incidence in the areas affected was rather more than 1 case per 1000 population—much lower than the 1% incidence in Brightlingsea.

Investigations

All the patients were admitted to the infectious-disease unit of the Colchester Group Hospitals. Lumbar puncture was done on nearly all the patients, and stools and samples of blood were taken and sent for examination to Dr. P. Martin at the Public Health Laboratory, Ipswich. Samples of stool from some of the contacts were also submitted for isolation of virus. Each family in which a case of poliomyelitis had occurred was visited, and a careful history was taken. Serological investigations were made at the Virus Reference Laboratory, Colindale, and the results of these investigations are reported in an accompanying article (Boissard 1958).

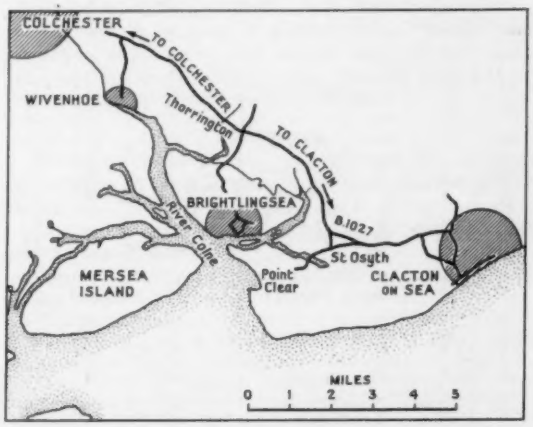
Clinical Findings

Nearly all the Brightlingsea patients complained of frontal headache. They had pyrexia (99–103°F), slight stiffness of the neck, and fairly severe stiffness of the lower two-thirds of the back. In about half the cases the hamstrings felt tight. Of the 40 patients 28 had a definite history of an "invasion" stage, with pyrexia, headache, and coryza, before the onset of meningeal symptoms and signs. The interval between this "invasion" stage and the onset of meningism varied from a few hours to several days.

24 cases were paralytic, most of them showing only slight or moderate muscle weakness. Only 3 patients needed subsequent treatment as inpatients of an orthopædic hospital. This is partly attributable to the mildness of many cases, but is also due to the fact that a particularly good physiotherapy service exists in the infectious-disease unit to which they were originally admitted.

Isolation of Virus

When this outbreak began, it was fortunate that I had been discussing with Dr. Martin, director of Ipswich Public Health Laboratory, the possibility of isolating the virus from the fæces of persons with poliomyelitis. Subsequently, with his cooperation, Dr. P. J. Wormald,



Topographical relations of Brightlingsea.

of the Cambridge Public Health Laboratory, isolated type-1 virus from 13 of the cases in this outbreak. No virus was isolated from the stools of the 6 contacts which were submitted for examination.

Spread of Poliomyelitis

An impressive fact at the start of the outbreak was the apparent association of some of the patients (table II). Cases 2, 4, 5, and 6 all lived within a short distance of each other and played together out of school. Case 3 had associated with case 2 at school, and case 9 was the mother of case 3. No evidence was obtained of spread of the disease by food or by water; the spread seemed to be either by droplet infection or by fæces. The "narrow stream" spread of poliomyelitis seemed to continue throughout the outbreak.

The following probable chains of spread are interesting:

Chain A.—Case 4 (onset March 17) probably infected case 6 (onset March 22). They played together out of school but attended different schools. Case 13 (onset March 31) played regularly with cases 4 and 6. Case 30 (onset April 14) was the father of case 13, and case 35 (onset April 19) was the married sister of case 30 and was alleged to have been in contact with cases 13 and 30. Case 20 (onset April 5) also played with case 6, who lives opposite. Case 23 (onset April 7) was the sister of case 4 (onset March 17) and had been kept in home and garden quarantine since her sister's illness. Case 14 (onset April 1) had been in contact with case 4 at school.

It is possible to lengthen chain A. Case 2 (onset March 11) was the neighbour and playmate of case 4. Complement-fixation tests indicated that case 2 had type-1 poliomyelitis. Case 5 (onset March 18) was the father of case 2. The complement-fixation tests again indicated a type-1 infection, but type-2 virus was isolated from the stools. It is for this latter reason that these 2 cases are not included in chain A.

Chain B.—Case 12 (onset March 31) played regularly with case 19 (onset April 4). Case 19 was isolated from March 31. Case 22 (onset April 7) was the aunt of case 12 and was in contact with him on March 24 and 31.

In 1956 I vaccinated 13 children in Brightlingsea against poliomyelitis. None of these children had symptoms of poliomyelitis, although several of them were very close contacts of confirmed cases of poliomyelitis. Furthermore, in each of nine families concerned there were 2 cases of clinical poliomyelitis.

Incubation Period

The communicability of poliomyelitis appears to be greatest during the latter part of the incubation period and the onset of symptoms. An attempt was made to calculate the probable shortest incubation period in some of the cases. For the purpose of this calculation the onset of the invasion phase of the illness was taken as the onset

TABLE II—ANALYSIS OF CASES

Case no.	Age (yr.)	Sex	Type of poliomyelitis	Onset (1957)	Admission to hospital (1957)	Shortest possible incubation (days)	Remarks
1	4	M	Paralytic	Jan. 28	Feb. 5	..	No contact established
2	6	M	"	March 11	March 11	..	No contact established, attended infants' school, C.F.T. suggested type-1 virus
3	6	M	"	" 15	" 15	..	Attended same school as cases 2 and 4, C.F.T. suggested type-1 virus
4	7	F	"	" 17	" 19	..	Attended same school as cases 2 and 3, neighbour and close contact of case 2
5	33	M	"	" 18	" 19	7	Father of case 2, type-2 virus isolated from stools, C.F.T. suggested type-1 virus
6	9	F	"	" 22	" 26	6	Contact of case 4 regularly until March 16, type-1 virus isolated from stool
7	3 10/12	M	"	" 25	April 1	..	No known contact, type-1 virus isolated from stool
8	3	F	Non-paralytic	" 25	" 2	..	Close companion of case 7, probably infected from same unknown source, type-1 virus isolated from stool
9	29	F	Paralytic	" 27	" 6	12	Contact (mother) of case 3
10	20	M	"	" 28	March 28	..	No established contact, cubmaster and Sunday-school teacher
11	5	F	"	" 31	" 31	..	No known contact, attended Sunday-school, attended infants' school until March 22, kept away by mother as precautionary measure only, type-1 virus isolated from stools
12	3	M	"	" 31	April 3	..	No known contact
13	6 10/12	M	"	" 31	" 8	..	Played with cases 4 and 6, attended school for four days after start of invasion period April 5–8, type-1 virus isolated from stools
14	6	M	"	April 1	" 1	..	Attended infants' school, had played with case 4 at school, type-1 virus isolated from stool
15	4	M	Non-paralytic	" 1	" 3	..	Had played a week previously with child X, who had been ill with vague pyrexial illness
16	4 1/2	M	Paralytic	" 2	" 3	..	Contact of case 15 and X
17	4 1/2	F	Non-paralytic	" 2	" 3	..	No definite contact
18	6	F	"	" 4	" 8	..	Attended infants' school until April 4, contact of case 3 in school twenty days before and of X fourteen days before
19	4	M	Paralytic	" 4	" 8	5	Played regularly with case 12 until March 30, no contact with other children whatever
20	8 1/2	M	"	" 5	" 6	14	Played with case 6, who lived opposite, until March 22, attended junior school, type-1 virus isolated from stool
21	3	M	Non-paralytic	" 6	" 8	..	Indefinite contact of case 12, type-1 virus isolated from stool
22	33	F	"	" 7	" 7	7	Aunt of case 12, had been in contact seven and fourteen days before onset
23	13	F	"	" 7	" 11	18	Sister and contact of case 4, had been isolated at home and in garden since March 17 (onset of case 4)
24	7	F	Paralytic	" 7	" 13	..	Attended infants' school, in contact with X and in contact with case 18 before March 29
25	4	M	Non-paralytic	" 7	" 14	..	Contact and neighbour of case 21, type-1 virus isolated from stool
26	13/12	F	"	" 7	" 14	..	Sister of case 25 and contact of case 21, type-1 virus isolated from stool
27	3	F	Paralytic	" 8	" 8	15	Played each day with case 8, most likely contact, last played on March 24
28	4	F	Non-paraltyic	" 10	" 13	..	Sister of case 24, type-1 virus isolated from stool
29	3	F	"	" 14	" 17	..	No known contact
30	36	M	Paralytic	" 14	" 18	14	Father of case 13
31	9	M	"	" 14	" 21	10	Regular playmate of case 18 and her brother (case 33), type-1 virus isolated from stool
32	16 3/4	F	Non-paralytic	" 15	" 15	..	Teacher at Sunday school, no other contact
33	9	M	Paralytic	" 15	" 15	7	In regular contact with case 18 (sister) until April 8, type-1 virus isolated from stool
34	11/12	M	"	" 18	" 22	4	Brother of case 31, no other contact known
35	42	F	Non-paralytic	" 19	" 20	..	Sister of case 30 and aunt of case 13, in contact regularly with each
36	6	M	"	" 22	" 22	..	Neighbour and contact of case 24 and playmate of case 33, attended infants' school
37	5	M	"	" 23	" 23	..	No known contact, had been kept away from infants' school for three weeks before April 9, unknown illness in children next door
38	11/12	F	Paralytic	" 26	" 29	..	Sister of case 37
39	12	F	Non-paralytic	May 4	May 9	11	Last attended secondary school on April 9, neighbour and playmate of case 37
40	5	M	Paralytic	June 4	June 4	..	Father a schoolmaster, no contact known

TABLE III—SCHOOL CONTACTS

No.	Age (yr.)	School	Class	Remarks
A*	5	Infants	II	
B*	6½	,,	I	Admitted to hospital on April 1 with paralytic poliomyelitis
C*	4½	..	..	Sister of B
D*	5	Infants	II	Started school on May 9
E*	5	,,	II	Started school on May 9
F*	6½	,,	I	Absent March 25–29
G	3½	..	..	
H	5	Infants	II	Started school on May 9
I	6	,,	I	Absent on April 8

* Serological evidence of type-1 infection.

of the disease, and it was assumed that the infection was acquired on the last day of contact. It must be borne in mind, however, that the history of onset given by parents, or in some cases by the patient, was occasionally open to question.

Example A.—Case 6 was in regular contact with case 4 until March 16, and developed symptoms on March 22. The shortest incubation period would therefore be six days.

Example B.—Case 12 developed poliomyelitis on March 31. Case 19 had played with case 12 and no other children until March 30. The onset of symptoms in case 12 was on April 4. The shortest incubation period was therefore five days.

Example C.—Case 23 developed symptoms of poliomyelitis on April 7. Her sister, case 4, had developed poliomyelitis on March 17, was admitted to hospital on March 19, and since this date had not been at school but had been at home in quarantine. The shortest incubation period in case 23 was eighteen days if case 4 was potentially infectious until she was admitted to hospital.

Examination of the other cases in which it was considered possible to calculate a probable shortest incubation period shows a period ranging from five to eighteen days.

Serological Investigations

Dr. Guy Boissard (1958) has been very kind in allowing me to use the results he obtained from his serological investigations. The blood from 9 unvaccinated children was examined; 6 of them provided evidence of a recent type-1 poliovirus infection (table III). Of these 6 children 1 (B) had been in hospital as a notified and confirmed case of paralytic poliomyelitis, and his sister (C), who had no symptoms, was another.

B, F, and I were all in the same class at school; I's blood provided no evidence of recent polio infection, but that of B and F did.

A, D, E, and H were all in the same class after May 9 (D, E, and H went to school for the first time on this date). The last notified case of poliomyelitis in the outbreak occurred in this class in June. H's blood provided no evidence of a recent type-1 infection, but that of A, D, and E did.

It is not known to what extent any of these children, other than B and C, came into contact with one another while at school. Only 2 children in the series had not attended school: C, sister of B (the known paralytic case), provided serological evidence of a recent infection with type-1 virus, but G provided none.

Synopsis of Preventive Measures

Immediate notification of all cases was ensured. The general practitioners in the town telephoned me immediately they had seen a suspected case. Families affected were then visited forthwith and advised of the precautions to take. Contacts of school age were excluded from school, and contacts of any age in the food trade or whose occupation brought them into close contact with children were excluded from their employment for three weeks. Regular communications were sent to the general practitioners in the area, describing the course the outbreak was taking.

To combat rumours a daily bulletin was posted on the notice board at the Town Hall, detailing the number of cases in hospital, those discharged, and the total number of confirmed cases. Furthermore, a town meeting was called at which the situation was described, precautions to be taken were outlined, and questions put by members of the public were answered. The schools broke up for the Easter holidays on April 9 and remained closed until May 9.

Cooperation between Services

It is well worth recording the cooperation that existed between the general practitioners, the medical officer of health, the hospital services, the consultant in infectious disease (who is also medical officer of health of Colchester), and the Public Health Laboratory Service. Without this wide cooperation it is doubtful if such an investigation would have been possible.

Discussion

This outbreak began when notifications of poliomyelitis for England and Wales were at their lowest point, and it had ended before the usual seasonal increase in the country was well developed. Chronologically it seemed to precede the spread of poliomyelitis in other parts of Essex. This outbreak can therefore be described as " out of season."

Bradley (1950) described how, in small communities where there was a high incidence of poliomyelitis, 2 or more cases in a household were not uncommonly reported, and that, when this happened, a chain of contacts between households could be defined more easily than usual, the disease appearing to spread in a narrow stream of the population. Bradley (1952) considered that the poliomyelitis virus causing disease moved through a narrow stream of the population. These phenomena were apparent in this Brightlingsea outbreak.

The expert committee of the World Health Organisation which met in 1953 concluded that for every person with symptoms of poliomyelitis there may be 10–100 infected individuals with no symptoms. Boissard's (1958) serological investigations in Brightlingsea confirm this conclusion. It is unfortunate that no evidence is available about the type of poliomyelitis virus concerned in the previous outbreaks in Brightlingsea, but it seems doubtful whether type-1 virus was concerned.

The results suggest that a " narrow stream " of infection existed not only among those persons with diagnosable poliomyelitis but also probably among those with a clinically undiagnosable infection.

Summary

Poliomyelitis broke out in the relatively isolated community of Brightlingsea at an unusual time of the year.

Laboratory evidence confirmed that the outbreak was due to type-1 virus.

The large number of cases was due to the presence of many people not immune to type-1 virus.

The narrow stream of spread is well shown.

I wish to thank Dr. W. H. Bradley and Dr. A. T. Roden, of the Ministry of Health, for their suggestions and guidance in presenting this paper; Dr. J. D. Kershaw, medical officer of health, Colchester, and consultant in infectious disease, for his guidance and his contribution of clinical details; Dr. P. Martin, director, Ipswich Public Health Laboratory, Dr. P. Wormald, of the Cambridge Public Health Laboratory, and Dr. G. Boissard, of the Virus Reference

Laboratory, for their cooperation; and Mr. James Colvin, the surveyor and public health inspector of Brightlingsea, who assisted me so ably in these investigations during the outbreak.

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ANTIBODIES AGAINST POLIOVIRUS IN VACCINATED AND UNVACCINATED CHILDREN IN AN EPIDEMIC AREA

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AN epidemic caused by type-1 poliovirus broke out in Brightlingsea, Essex, in the first half of 1957 (Pearce 1958). In a population of 4500 there were notified 46 cases, of which 40 were later confirmed as poliomyelitis.

13 children in Brightlingsea had each received two doses of poliomyelitis vaccine on May 17 and June 13, 1956. The high clinical attack-rate in Brightlingsea in April, 1957, prompted a comparative antibody study of small groups of vaccinated and unvaccinated children. A single sample of blood was obtained from each child on July 4, 1957. Except for 1 unvaccinated child, both groups consisted of children who had not been ill. It was of particular interest to determine, if possible, whether infection with poliomyelitis virus after immunisation would cause heterologous complement-fixing (C.F.) antibodies to appear. The children were selected as follows:

The names of unvaccinated children, aged 3–9 years, on the birth registry in Brightlingsea were arranged in alphabetical order and numbered 1–138. 60 of these, consisting of 26 boys and 34 girls, were similar in age to the vaccinated group, and 12 of them were paired with 12 of the vaccinated children according to sex by using random numbers. Of the 9 vaccinated and 9 unvaccinated children allowed to take part 6 pairs turned out to have been randomised for age and sex as described, since 3 unvaccinated half-pairs who defaulted were replaced by 3 unvaccinated children who were not randomised alternatives for those particular vaccinated children.

Methods

Tissue cultures for neutralisation tests.—Six-day cultures of monkey-kidney cells were maintained on 1 ml. of Eagle's (1955) medium, with added 2·0% of inhibitor-free inactivated horse-serum and 0·1% sodium bicarbonate. The inoculum used for each culture in titrations was 0·1 ml. of virus or of virus-serum mixture. All the test-serum, control-serum, and control-virus titrations were done on one batch of tissue cultures. Fluid from cultures showing degeneration of doubtful origin was subinoculated on the sixth day after inoculation. This was done in 29 of 742 of the cultures used (3·9%).

Virus suspensions.—The strains used in neutralisation (N) and in complement-fixation tests (C.F.T.) were type-1 Mahoney, type-2 MEF-1, and type-3 Saukett. These were grown in monolayer cultures of monkey-kidney cells maintained on Mixture 199 (Morgan et al. 1950). The harvested culture fluids were centrifuged at 5000 r.p.m. for an hour at +4°C, and the pooled supernatant fluid of each type was distributed and stored at this temperature.

Virus titrations.—Suspensions were diluted in tenfold steps with Mixture 199 containing 0·1% bicarbonate. Four tissue cultures were inoculated with each dilution of virus. Geometric mean titres were $10^{-6\cdot0}$, $10^{-5\cdot7}$, and $10^{-6\cdot2}$ for virus of types 1, 2, and 3 respectively.

Neutralisation by test sera.—These were stored at −30°C and were thawed once only before being tested. Sera were heated at 60°C for twenty minutes. Serial dilutions of each serum in Hanks' solution containing 0·01% sodium bicarbonate were mixed in 0·6 ml. volumes with an equal volume of virus suspension to give serum dilutions of 1/8–1/4096 in fourfold steps and an estimated challenge dose of 100 T.C.I.D.$_{50}$ per 0·1 ml. of inoculum of each virus type. After being shaken the serum-virus mixtures were placed at 37°C in an air incubator for three and a half hours (Medical Research Council 1957a) before inoculation of two tissue cultures with each dilution.

Neutralisation by control sera.—British Standard poliomyelitis monkey antisera from the department of biological standards, Mill Hill, were hydrated as directed. Serial dilutions of each serum were mixed in 1 ml. volumes with an equal volume of each virus suspension used in the test, to give control serum dilutions from 1/40 to 1/320 in twofold steps. These were then treated like the test sera, except that four tissue cultures were inoculated with each dilution.

Complement-fixation test.—The method of Fulton and Dumbell (1949) was used in straight-line tests as described by Le Bouvier (1953). The optimum concentrations of the live-virus suspensions which served as antigens in the test were 1/2 for Mahoney and Saukett; MEF-1 was used as the undiluted suspension. Two exact units of complement were added in the test, the unit being defined as the highest dilution of complement which, when titrated in the presence of each virus suspension under the conditions of the test, caused 50% hæmolysis of the maximally sensitised sheep red cells. Serum dilutions in barbitone buffer were screened at initial dilutions of 1/4–1/64 in twofold steps. Serum controls, virus and culture-medium controls, and hæmolysis controls were included in the test.

Results

Control Sera

The neutralising titres obtained in the test were 1/160, 1/190, and 1/280 for type 1, 2, and 3 sera respectively. The geometric mean titres for the British Standard poliomyelitis sera are published as 1/480, 1/806, and 1/960 for type 1, 2, and 3 sera respectively (Medical Research Council 1957a), but in the M.R.C. tests five times greater volumes of each serum were used. In table I the reciprocals of the neutralising antibody titres of the test sera have been multiplied by the ratios 3, 4, and $3^1/_2$ for types 1, 2, and 3 respectively, to facilitate comparison of these results with those published by the Medical Research Council (1957b) on the antigenic activity of British poliomyelitis vaccine in children.

Sera of Unvaccinated Children

Type-1 antibody.—Table I shows that of the 9 sera, 6 had type-1, 1 had type-2, and none had type-3 neutralis-

TABLE I—RECIPROCALS OF SERUM DILUTIONS (IN SERUM-VIRUS MIXTURES) WHICH NEUTRALISE 100 T.C.I.D.$_{50}$ OF EACH POLIOVIRUS TYPE
(Sera of vaccinated and unvaccinated children collected July 4, 1957)

Children vaccinated in May and June, 1956						Unvaccinated children registered in 1956					
Case no.	Age (yr.)	Sex	Poliomyelitis antibody			Case no.	Age (yr.)	Sex	Poliomyelitis antibody		
			Type 1	Type 2	Type 3				Type 1	Type 2	Type 3
1*	$3^5/_{12}$	F	<32†	2048	112	10*	4	F	<8	<8	<8
2*	$5^2/_{12}$	M	12,288	1024	896	11*	6	M	3072	<8	<8
3*	$6^2/_{12}$	F	24	512	3584	12*	7	F	3072	<8	<8
4*	$6^7/_{12}$	M	6144	2048	56	13*	$6^7/_{12}$	M	1536	<8	<8
5*	$5^1/_{12}$	F	12,288	512	<8	14*	$5^4/_{12}$	F	<8	<8	<8
6*	$5^1/_{12}$	F	6144	512	14,336	15*	$6^1/_{12}$	F	<8	<8	<8
7	$6^1/_{12}$	F	3072	4096	<32†	16	$5^1/_{12}$	F	1536	<8	<8
8	$3^2/_{12}$	M	1536	8192	<8	17	$5^2/_{12}$	F	384	32	<8
9	$4^4/_{12}$	M	3072	1024	1792	18	$4^{11}/_{12}$	F	1536	<8	<8

* Vaccinated and unvaccinated pairs randomised for age and sex.
† Dilution at 8 not tested.

ing (N) antibody. Case 13, from whom type-1 poliovirus was isolated in the Cambridge Public Health Laboratory, had paralytic poliomyelitis, but his sister (case 18) and the 4 other children with type-1 N antibody were not known to have had poliomyelitis. Table II shows that 5 of the 6 sera with type-1 N antibody also fixed complement with type-1 virus.

Type-2 antibody.—Only case 17's serum (table I) neutralised the test dose of type-2 virus at 1/32 dilution.

TABLE II—RECIPROCALS OF COMPLEMENT-FIXING ANTIBODIES TO THREE POLIOMYELITIS VIRUSES

Vaccinated children				Unvaccinated children			
Case no.	Poliomyelitis virus			Case no.	Poliomyelitis virus		
	Type 1	Type 2	Type 3		Type 1	Type 2	Type 3
1	<4	<4	<4	10	<4	<4	<4
2	>64	16	64	11	>16<32	<4	>4<8
3	<4	<4	>8<16	12	16	<4	<4
4	>4<8	<4	<4	13	>8<16	<4	<4
5	8	<4	<4	14	<4	<4	<4
6	>16<32	4	>32<64	15	<4	<4	<4
7	>16<32	>4<8	8	16	16	<4	<4
8	32	16	<4	17	<4	<4	<4
9	>16<32	4	>8<16	18	32	<4	<4

None of these sera fixed complement with type-2 virus at 1/4 dilution (table II).

Type-3 antibody.—No serum neutralised the test dose of type-3 virus at the lowest dilution tested; but table II shows that case 11's serum contained heterologous C.F. antibody to type-3 virus.

These serological results indicate that infection by type-2 and type-3 viruses had not been hitherto widespread in this community.

Sera of Vaccinated Children

Type-1 antibody.—Table I shows that cases 1 and 3 had serum N antibody commensurate with the level of type-1 antibody found a year after two doses of vaccine (Medical Research Council 1957b). These two sera did not fix complement with type-1 virus (table II), and the findings suggest that these 2 children escaped infection during the epidemic. The type-1 N antibody titres of the 7 other sera were higher than might be expected a year after immunisation, and it appears probable that antibody response had been reinforced in these children by infection with type-1 virus. In 4 of these sera the high titres found would be unusual after a primary infection in unimmunised children. These 7 sera reacted positively in the C.F.T. (table II), but the C.F. antibody titre was low in the sera of cases 4 and 5 (see below).

Type-2 antibody.—Case 8's serum N antibody titre (table I) of 1/8192 suggests an infection by type-2 virus either before or after immunisation. Table II shows that 5 of the 9 sera fixed complement with type-2 virus, a rational explanation being that this was because of heterologous C.F. antibody produced in response to infection of these children by type-1 virus (Casals et al. 1952, Svedmyr et al. 1953, Schmidt and Lennette 1956). The lack of heterologous C.F. antibody in the sera of cases 4 and 5 is discussed below.

Type-3 antibody.—Sera from cases 5 and 8 did not neutralise the test dose of type-3 virus at 1/8 dilution, and at 1/2 dilution when subsequently retested. Case 6's serum N antibody was of the order of a secondary response, irrespective of whether primary immunisation or infection occurred first. In case 3's serum (table I) type-1 and type-2 N antibodies were within the range of titres found a year after two doses of vaccine, but her serum type-3 N antibody was at the uppermost limit of the observed range (Medical Research Council 1957b). Since this serum gave fixation with type-3 virus in the C.F.T., there is reasonable evidence that case 3 had been infected by this virus, possibly within the preceding year. It is known that type-3 virus was introduced into the area during the epidemic (J. A. Dudgeon, personal communication). Of the 5 sera which gave heterologous C.F. reactions with type-2 virus 4 gave heterologous C.F. reactions with type-3 virus (table II). The fact that case 8's serum did not react in this way with type-3 virus, although fixing complement with type-2 virus, is similar to the observation of Svedmyr et al. (1953) that convalescent sera may fix complement with sometimes one and sometimes both of the heterologous viruses. The sera of cases 4 and 5 showed no heterologous C.F. antibody to type-3 virus.

Discussion

There were striking similarities and differences in both N and C.F. antibodies in the sera of these two small groups of children differing only, so far as could be ascertained, in their vaccination status. Both groups showed serological evidence of infection by type-1 poliovirus—7 of the vaccinated children against 6 of the unvaccinated children—yet all but one of these infections were subclinical.

It is clear that, in some of the vaccinated children, natural infection had had a similar effect on N antibody to that of a third or reinforcing dose of poliomyelitis vaccine. In contrast to the unvaccinated children, most of the vaccinated children's sera had all three types of N antibody in high titre a year after they had received two doses of poliomyelitis vaccine.

Since these sera were collected four months after the April peak of the epidemic, no evidence can be adduced about transitory heterotypic type-2 antibody (Casals et al. 1952, Sabin 1952).

The culture-medium control, which is known to fix complement with very few human sera in the absence of any anticomplementary effect, gave no indication that non-specific C.F. reactions occurred between the test sera and monkey-kidney cell antigens or other constituents.

Table II shows that there were more monotypic C.F. reactions in the sera of the unvaccinated children than in the sera of the immunised group. Since the two groups of children were of similar age, this difference in serological response must be ascribed to immunisation with poliomyelitis vaccine. This immunotherapy presumably had caused heterologous C.F. antibody to appear in the sera of those children who had experienced either an earlier or a subsequent subclinical poliovirus infection. Black and Melnick (1954) noted a similar phenomenon in a group of 30 persons tested for N and C.F. antibodies before and after inoculation with a formalin-inactivated type-1 virus. None had C.F. antibodies before inoculation. The C.F. response was confined almost entirely to those persons and those types where there was pre-existing N antibody.

Case 11's serum contained heterologous C.F. antibody to type-3 virus in the absence of N antibody at 1/8 dilution of serum. Similar observations were made by Melnick (1955) and Hammon et al. (1955). Attention was directed by Mayer (1955) to possible reasons for cross-C.F. reactions

between the three poliomyelitis viruses when unpurified concentrated virus suspensions are used. Mayer et al. (1957) have shown that highly purified suspensions of the three viruses have type-specific C.F. reactions with human convalescent sera.

Of the vaccinated children, case 1's serum showed no complement fixation with any poliovirus. With the test in use here it has been found that primary immunisation with two doses of vaccine does not appear to give rise to detectable levels of C.F. antibody in the absence of diagnosed infection. Exceptions do occur, but in such persons it has been impossible to rule out antecedent subclinical infection. Some recent tests in collaboration with Dr. J. O'H. Tobin and Dr. A. D. Macrae have shown that a third dose of vaccine is generally followed by the appearance of all three types of C.F. antibody. How long these C.F. antibodies persist is not yet known.

When suspensions of unheated live virus are used as antigens in the poliomyelitis C.F.T., homologous C.F antibody often appears slowly in the sera of persons who have not before been infected by any poliomyelitis virus (Black and Melnick 1954, Le Bouvier 1955, Schmidt and Lennette 1956). The development of heterologous C.F. antibodies annuls the diagnostic value of a single convalescent specimen of serum; but, because of their rapid appearance, a rise in titre of homologous C.F. antibody can be demonstrated in a substantial proportion of cases, in felicitously spaced sera, when suitable virus suspensions are used (Schmidt and Lennette 1956).

The problem is of practical importance, now that widespread immunisation of children is being practised. The evidence presented suggests that primary immunisation increases the frequency with which heterologous C.F. antibodies appear in such children's sera when they are infected by a poliovirus.

C.F. antibodies decrease in time and may become undetectable after a few months (Lennette and Schmidt 1957). Heterologous C.F. antibody tends to wane even more rapidly. Since the date of infection is not known for any of the children investigated, it is possible that the low homologous C.F. antibody titres of the sera of cases 4, 5, and 17, as well as the absence of heterologous C.F. antibody from the sera of cases 3–5, are a result of such antibody decline.

Conclusions

This small-scale investigation calls for suggestions rather than assertions, but there is some evidence that:

(1) Infection superimposed on primary poliomyelitis immunisation causes in some children a N-antibody response to the infecting virus, similar to that of a third dose of vaccine.

(2) It is essential to obtain paired sera from immunised children when investigation by the C.F. technique for poliomyelitis is required.

(3) The C.F.T. is still of value in the diagnosis of poliomyelitis infections in children who have received two doses of vaccine; but recent tests on sera obtained a fortnight after a third dose of vaccine suggest that the C.F.T. may be of little or no value in diagnosing subclinical poliomyelitis infections during this period.

Summary

Serological tests for neutralising and complement-fixing antibodies were made on two small similar groups of children: one group had received two doses of poliomyelitis vaccine in 1956; and the other group had been registered but was not yet vaccinated.

The investigation was made a few months after a poliomyelitis epidemic in 1957.

In children who already have been immunised with two doses of vaccine the C.F.T. for poliomyelitis may be of diagnostic value, but only when paired sera are examined.

Recent tests made on sera taken a fortnight after a third dose of vaccine indicate that the C.F.T. will be of little or no diagnostic value during this period.

Infection a year after immunisation with two doses of vaccine causes in some children an N-antibody response to the infecting virus, similar to that of a third dose of vaccine.

I wish to thank Dr. J. D. Kershaw, area medical officer for North East Essex, and Dr. Eleanor Singer, assistant county medical officer of health, for their help; Dr. R. D. Pearce, medical officer of health for Brightlingsea, and his staff, without whose cooperation this investigation would not have been possible; Dr. W. C. Cockburn, director, Central Public Health Laboratory; Dr. F. O. MacCallum, director, Virus Reference Laboratory; and Dr. C. C. Spicer, who randomised the registered children.

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International Requirements for Poliomyelitis Vaccine

International requirements for the production and control of the Salk type of poliomyelitis vaccine have been formulated by a group of experts meeting recently in Geneva under the auspices of the World Health Organisation and the chairmanship of Dr. J. H. S. Gear. In the past difficulties have often been put in the way of the free exchange of vaccine because of differences in the manufacturing and control methods applied in the country of origin and in the country wishing to use the vaccine. When finally accepted, the new requirements are expected both to facilitate the international exchange of vaccine and to provide guidance and assistance to countries wishing to start production and control of vaccine. This is particularly important now because in many countries where poliomyelitis was formerly rare, there have been severe epidemics in recent years.

Other biological substances such as yellow-fever and cholera vaccine, blood and plasma, will be the subjects of similar recommendations for production and control requirements to be formulated by other W.H.O. study groups during the coming months. This work is a new development in one of W.H.O.'s most important programmes, that of biological standardisation. In cooperation with more than 100 laboratories in different parts of the world, W.H.O. has so far established about 50 new biological standard preparations, ranging from diphtheria antitoxin to a whole series of antibiotics. This has made it possible for these substances to be measured and described in terms of international units accepted throughout the world.

Special Articles

"CALLING DR. KILDARE"

STAFF-LOCATION SYSTEMS SUITABLE FOR HOSPITAL USE

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IN a large hospital much of the work is done with the help of the telephone. An efficient communication system is an important part of the structure and one which is seldom provided. Existing installations in many hospitals are unsatisfactory for the following reasons:

(1) At certain times of the day the switchboard becomes overloaded and no lines are available for incoming or outgoing calls.

(2) Even when lines are available, the switchboard operators are often so busy that there is delay in dealing with calls.

(3) Much time is wasted in finding members of the staff required for a telephone call. Nurses and other skilled people are often used as messengers.

(4) Telephone bells make an unwelcome noise in the wards.

Staff-location Systems

One of the principal defects in existing hospital communications is the lack of a satisfactory method of finding an individual and bringing him to the telephone to answer an incoming call. The staff of a large hospital may include 50–100 people who are often sought for this purpose; on many occasions only one person is competent to deal with a particular inquiry or request. The problem of finding an individual, who may be anywhere in a large building, without disturbing anyone else, is technically difficult and until recently has never been satisfactorily solved.

A study of this matter was begun in the Regional Physics Department in 1953 at the suggestion of Prof. C. F. W. Illingworth. The first step was to write an outline specification of the equipment required. The ideal characteristics for a staff-location system were decided to be the following:

(1) It should be silent.

(2) It should attract the attention of the individual who is being sought but not of anyone else.

(3) It should operate at every point in the building.

(4) It should not require any attention or concentration on the part of the staff who use it.

No conventional telephone installation will meet these requirements, nor will any system of loudspeakers or coloured lights. Consideration was therefore given to the possibility of pocket receivers, each tuned to a particular frequency and actuated by signals under the control of the telephone-switchboard operator. Such a system appeared technically feasible, and inquiries were made of several manufacturers. A voluminous correspondence ensued, but by the middle of 1955 it was apparent that none of the firms approached was in a position to do what was required.

* Now with J. and P. Coats Ltd., Paisley.

Towards the end of 1955 it was learnt that two firms, Multitone Electric Co. Ltd. and British Communications Corporation Ltd., were engaged in developing staff-location systems answering to the specification outlined above, using the magnetic induction method. This is a simple and surprisingly effective way of transmitting signals to any place inside a building. It uses the following apparatus:

(1) A continuous wire attached to the outside of the building and forming a loop.

(2) A transmitter connected to the ends of the loop.

(3) A control unit placed near the main telephone switchboard.

(4) Pocket receivers using transistors for detection and amplification.

The external wiring is easily done. Aluminium wire about 3 mm. in diameter covered with a 1-mm. layer of polyvinyl chloride is a suitable material, being cheap and durable. For a six-storey building of 19th-century construction a single loop at second-floor level will often be adequate. For more modern buildings, containing a lot of structural steelwork, subsidiary loops may be necessary to eliminate dead spots inside. It is usually convenient to fix the wire to the outside walls, with staples every few yards but it can equally well be attached to the skirting boards or the inside walls.

The transmitter is an electronic device generating alternating current at several frequencies, one for each receiver. Once installed the transmitter needs little attention.

The control unit is a small box with switches or push-buttons corresponding to the various frequencies obtainable from the transmitter.

Each receiver is tuned to a particular frequency. By pressing one key on the control unit the switchboard operator sends through the loop a signal which will be detected by only one receiver. The normal practice is to transmit a buzzer signal, which advises the recipient to go to the nearest telephone to take an incoming call. Facilities for speech transmission are also available, but they are not likely to be of much use in a hospital. Two-way communication is not yet possible.

The following systems are now being made in Britain:

Multitone Staff-Location System (Multitone Electric Co. Ltd., 12–20, Underwood Street, London, N.1) installed at St. Thomas's Hospital, Westminster Hospital, St. George's Hospital, Manchester Royal Infirmary, &c.

Radiopage (British Communications Corporation, Ltd., Exhibition Grounds, Wembley) installed at Western Infirmary, Glasgow; Royal Mental Hospital, Glasgow; The London Hospital; &c.

Selectacall (Westrex Co. Ltd., Liberty House, Regent Street, London, W.1) installed at Duchess of York Hospital for Babies, Manchester.

Another system, using V.H.F. radio transmission instead of magnetic induction, has been announced but not yet installed in a hospital:

Page Boy (Cotterill-Ginn, Ltd., 13, Suffolk Street, London, S.W.1). Signals are transmitted from suitably placed radiators, each containing a small oscillator and an aerial. The radiators are connected to the control unit by lead-covered cable; no loop is placed round the building.

Further details of these systems are given in the table.

Other manufacturers are known to be developing staff-location systems, but details are not available.

DETAILS OF STAFF-LOCATION SYSTEM

—	Multitone	Radiopage	Selectacall	Page Boy
Size of receiver (cm.)	14 × 3	19 × 7 × 2	13 × 5 × 2	15·0 × 7·0 × 2·5
Mass of receiver (g.)	140	225	150	175
No. of separate frequency channels *	36 or 56 (different models)	50	50 or 100 (different models)	144
Frequency band used by transmitter	2–15 kc/s	75–87 kc/s	155 kc/s	465 mc/s
Method of frequency selection	Tuned circuit in receiver	Crystal-controlled filter in receiver	Tuned reeds in receiver	Tuned circuit in receiver
Power supply for receiver	Mercury battery	Mercury battery	Hearing-aid battery	Rechargeable battery
Estimated life (wk.)	8–10	10–12	7–8	..
Cost of battery	2*s.* 6*d.*	7*s.* 6*d.*	3*d.*	..
Cost of transmitter and control unit	From £125 †	£475	£225 †	§
Cost of each receiver	From £18 18*s.*†	£25	£24 †	£21 15*s.*
Nature of signal	Buzzer ‡	Buzzer and speech	Buzzer	Buzzer ‡

* It is often convenient to extend the capacity of the system by allocating the same frequency to two or more receivers, using a simple code to provide separate calling signals.
† Also available on ten-year lease, with quarterly rental.
‡ Speech signal also available by pressing switch and holding receiver to ear in response to special calling tone.
§ Modulator unit £52 10*s.* Radiators each £11 5*s.* The number required will depend on the size and shape of the building. A typical 500-bed hospital would probably use at least 20 radiators. Battery chargers £25 10*s.* for every 12 receivers.

Post Office Licence.—Each of these systems requires a special licence from the Post Office, at a charge of £2 for five years.

Trial and Results

A practical trial of a magnetic-induction system was made during 1956 and 1957 at the Western Infirmary of Glasgow. The external wiring of the building was completed, with contractor's labour, at a cost of under £300. A complete set of equipment was supplied on loan by the manufacturers. A research assistant (H. C. E.) spent about six months collecting data before and after the installation of the personal calling system.

EXISTING TELEPHONE INSTALLATION

The Western Infirmary has two main telephone systems:

(1) A Post Office installation consisting of a two-position switchboard with 17 exchange lines (of which 7 are available for outgoing calls only). To this switchboard 118 extension telephones are connected.

(2) A private automatic exchange for internal calls only, with 123 extension telephones. There are smaller installations in various departments of the hospital.

A survey made by the Post Office telephone department showed that the number of exchange lines provided for the hospital was about right for the volume of traffic, but that a larger switchboard, with more operators, was necessary for an efficient service at peak hours.

Telephone Traffic Handled by Switchboard

During the busy periods (from 9 A.M. to noon and from 2 P.M. to 5 P.M.) in one week a note was made of the destination of each call passing through the switchboard to a ward, department, or individual in the hospital. Some of these calls originated outside the hospital and some inside; calls passing out of the hospital were not recorded. Of the 1700 calls noted in this way 44% were for wards, 44% for departments, and 12% for named individuals.

Telephone Traffic in Ward Corridor

Observations were made on 200 incoming calls to a busy surgical unit. Of these 200 calls, 107 were inquiries about the progress of patients, usually from relatives or from doctors outside the hospital. Of the remaining 93 calls, 46 were for members of the medical staff of the unit. In 19 instances the person sought was found in the unit, with an average delay of 1·5 minutes. In 27 instances the person sought was not found in the unit: the average time elapsing before this information was given to the caller was 1·7 minutes.

In this small sample 41% of the doctors sought were found in their own units. A similar inquiry covering other parts of the hospital gave a result not significantly different: of 100 incoming calls to switchboard for named individuals the caller was connected at the first extension tried by the operator in 59 cases, at the second extension tried in 27, at the third extension tried in 10, at the fourth extension tried in 2, and at the fifth extension tried in 1 case. 1 caller rang off before the connection was made.

Waiting-time and Talking-time

The time occupied by the 200 above-mentioned incoming calls was 335 minutes, consisting of 62 minutes' ringing, 148 minutes' waiting for the person required to reach the telephone, and 125 minutes' talking. In other words, of the total time for which telephone circuits were occupied, 19% consisted in waiting for someone to answer the bell, 44% waiting for the person required to come to the telephone (total waiting-time 63%), and 37% of conversation between the caller and the person sought.

PERSONAL CALLING SYSTEM

When these inquiries had been completed the personal calling system was installed. Fourteen receivers were issued on Nov. 5, 1956, and others were gradually put into use up to a total of forty-five, leaving five as a reserve stock to cover breakdowns. The control unit was fixed in the switchboard room, and the operators quickly became familiar with their new duties.

The allocation of receivers was carefully considered in the knowledge that initial mistakes would not be rectified without difficulty and annoyance. After studying the results outlined above it was decided that receivers should be issued to the following groups of staff:

(1) *House-officers* in medical, surgical, gynæcological, and casualty units. These members of the staff have many responsibilities in the day-to-day conduct of the wards and are often hard to locate. This is particularly true on receiving days, when the residents are exceptionally busy and outside calls (about the admission of patients) are many.

(2) *Ward sisters.*—Half the calls coming to the wards are inquiries about the progress of individual patients. When the sister, or her deputy, has a personal receiver in her pocket, such inquiries can be handled very efficiently. The switchboard operator, on receiving a call for one of the wards, asks the caller if he is inquiring about a patient. If he is, the operator presses a switch on the control panel to transmit a buzzer signal heard by the sister or the nurse for whom it is intended. The recipient then goes to the nearest telephone and speaks to the inquirer.

(3) *Individual members of the hospital staff*, including the medical superintendent, the matron, the administrative officer, the catering officer, and a few doctors whose duties extend to many parts of the hospital.

(4) *Duty anæsthetists.*

Impressions of the New System

The issue of personal receivers produced an immediate improvement in the efficiency of the hospital telephone system. The following subjective reactions were noted:

(1) *Switchboard operators* reported that persons carrying receivers could be located in a fraction of the time normally required.

(2) *Practitioners* outside the hospital commented on the speed with which the receiving physicians and surgeons could now be found, in welcome contrast to the long delays previously experienced.

(3) *Ward sisters* reported that their corridors had suddenly become quieter. Where a full issue of personal receivers has been made, the telephone bell seldom rings, because most of the calls are notified individually to the people concerned; about 75% of the calls coming to a ward unit are intended for either the resident or the sister.

Objective Tests

From the information already presented it will be clear that a major source of inefficiency in the telephone system is the long delay before a call is answered by the person sought. Any improvement here will materially ease the switchboard operator's burden and will increase the amount of traffic that can be handled at busy periods of the day. With these considerations in mind an objective assessment of the calling system was attempted by making surveys of 500 calls for persons carrying receivers, and of 200 calls during the same period for persons not carrying receivers. The difference between the numbers of calls studied in these two surveys was due to the fact that, by the time that the observations were made, most of the people likely to receive a lot of calls had been issued with personal receivers. Consequently the number of calls for individuals outside the network was relatively small.

The significant parameter was judged to be the time required to locate the recipient of the call and bring him to the telephone. The result of the comparison was:

200 calls using ordinary telephone system: average delay 63 seconds.
500 calls using personal receivers: average delay 25 seconds.

Further analysis showed the following differences:

AVERAGE DELAY BEFORE BEGINNING OF REPLY TO CALLER

Type of call	Ordinary telephone (sec.)	Personal calling system (sec.)
Calls for doctors	80	35
Inquiries about patients ..	54	15

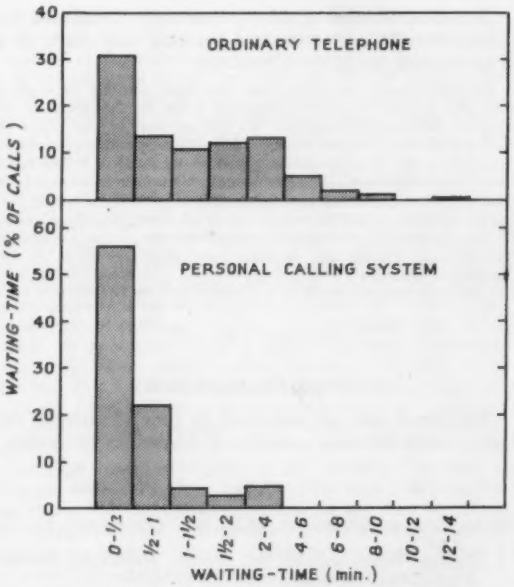
Since the talking-time is not appreciably different whether the call is announced by a personal receiver or by a telephone bell, the following comparison may be made:

	Ordinary telephone	*Personal calling system*
Average waiting-time (sec.)	63	25
Average talking-time (sec.)	38	38
Average total time per call (sec.)	101	63

The information collected in these two surveys is displayed graphically in the accompanying figure, which shows that the operators sometimes spent as long as 14 minutes in trying to find a member of the hospital staff for a telephone call. When the personal calling system was installed, the operators were advised not to wait longer than 2 minutes for a reply from the person sought. This restriction of waiting-time was observed in all but a few instances, when the operators were too busy with other calls. Even so, the longest delay before completion of a call or dismissal of the caller was no more than 4 minutes. The proportion of calls not completed because the recipient could not be traced was as follows:

Personal calling system: 56 of 500 calls (11%).
Ordinary telephone: 22 of 200 calls (11%).

These figures indicate that everyone responded to the personal-receiver call within the time allowed. The residue of 11% presumably represents the proportion of people called who were out of the hospital at the time.



Waiting-time in connection with ordinary telephone and with personal calling system.

General Observations

Cost.—The initial cost of a complete installation may be estimated from the figures given above. Other factors, including reliability and ease of maintenance, should also be considered if knowledgeable advice is available. The cost of the wiring depends on the system chosen and on the layout of the building. Detached blocks can be connected to the main loop by buried cables.

Number of receivers needed.—Our experience suggests that personal receivers should be issued only to people who will often be required to answer telephone calls and whose duties take them to many different places in the hospital—namely, house-officers and duty anæsthetists, ward sisters, and peripatetic officials (possibly including clerk of works, catering officer, administrative officer, and night sister).

Interference.—All the calling systems mentioned here operate at frequencies causing no interference with electroencephalographs, electrocardiographs, and other sensitive equipment likely to be found in a hospital.

Before a staff-location system is introduced, the local telephone manager of the Post Office should be asked to report on the condition of the hospital's communication facilities in relation to the traffic handled. A further survey should be made in the hospital by an investigator trained in the technique of work study. It will often be found that useful improvements can be effected at little or no cost by rearranging the existing installation. These inquiries will also provide a basis for administrative decisions on the purchase of a calling system and on the allocation of receivers. The cost of the investigations should not exceed £150, even in a very large hospital.

Summary

Staff-location systems suitable for use in hospitals have been devised by several manufacturers.

Technical features of the equipment now available are described and the results of a practical trial made in a large teaching hospital are reported.

The investigation described here was made possible by a grant from the Nuffield Provincial Hospitals Trust on the advice of its Scottish Advisory Committee. We are grateful to the board of management for Glasgow Western Hospitals for permission to carry out trials in the Western Infirmary, where we received much assistance from the medical superintendent as well as from members of the medical, nursing and administrative staff. We received expert and timely advice on many aspects of the work from Mr. W. A. Gay, of the department of industrial administration, Royal College of Science and Technology, Glasgow, and from members of the Telephone Manager's staff, Glasgow area. The apparatus used in the tests was supplied by British Communications Corporation Ltd.

BIRTHDAY HONOURS

THE list of honours published on June 12 contains the names of the following members of the medical profession:

O.M.

Sir MACFARLANE BURNET, M.D. Melb., M.D., SC.D. Cantab., F.R.C.P., F.R.S.
Director, Walter and Eliza Hall Institute, Melbourne; professor of experimental medicine, University of Melbourne.

K.C.V.O.

JOHN DOUGLAS MCLAGGAN, C.V.O., M.B. Aberd., F.R.C.S.

K.B.E.

CHARLES RITCHIE BURNS, O.B.E., M.D. N.Z., F.R.C.P.
Physician and cardiologist, Wellington Hospital, New Zealand.

FREDERICK HORACE SMIRK, M.D. Manc., F.R.C.P., F.R.A.C.P.
Professor of medicine, University of Otago.

Knights Bachelor

Brigadier JOHN SMITH KNOX BOYD, O.B.E., M.D., LL.D. Glasg., F.R.C.P., F.R.S.
President, Royal Society of Tropical Medicine and Hygiene; formerly director of pathology, War Office, and director of Wellcome Laboratories of Tropical Medicine.

Colonel ALDINGTON GEORGE CURPHEY, C.B.E., M.C., E.D., M.D. Queen's Univ., Canada
President, Legislative Council, Jamaica.

JOHN CAREW ECCLES, M.B. Melb., M.A., D.PHIL. Oxon, F.R.A.C.P., F.R.S.
Professor of physiology, Australian National University, Canberra.

BENJAMIN THOMAS EDYE, C.B.E., CH.M. Sydney, F.R.C.S., F.R.A.C.S.
Consulting surgeon, Royal Prince Alfred Hospital, Sydney.

Brigadier KENNETH BARRON FRASER, C.B.E., E.D., M.B. Sydney, M.S. Queensland, F.R.A.C.S.
Late Australian Military Forces; for public services.

ERIC WILLIAM RICHES, M.C., M.S. Lond., F.R.C.S.
Surgeon and urologist, Middlesex Hospital, London.

C.B. (Military)

Air Vice-Marshal LANCELOT MILLER CORBET, C.B.E., M.B. Melb.

Major-General JOHN HUSTON, M.B. Belf., F.R.C.S.E., Q.H.S.

Surgeon Rear-Admiral RICHARD LOUIS GIBBON PROCTOR, M.D. Dubl., F.R.C.P.I.

C.B. (Civil)

GEORGE EDWARD GODBER, D.M. Oxon., F.R.C.P.
A deputy chief medical officer, Ministry of Health.

C.M.G.

JAMES MALCOLM LISTON, M.B. Glasg.
Director of medical services, Tanganyika.

RICHARD MURCHISON MORRIS, O.B.E., M.D. Lond.
Secretary for Health, Federation of Rhodesia and Nyasaland.

C.V.O.

JAMES CROOKS, M.B. Edin., F.R.C.S.

C.B.E. (Military)

Colonel ROBIN ARTHUR SMART, M.B. Aberd., R.A.M.C.

Air Commodore DENIS AYMARD WILSON, A.F.C., M.R.C.S., F.F.R., Q.H.S., R.A.F.

C.B.E. (Civil)

DANIEL FOWLER CAPPELL, M.D. Glasg., F.R.F.P.S.
Professor of pathology, University of Glasgow.

CHARLES SKINNER HALLPIKE, M.B. Lond., F.R.C.P., F.R.C.S., F.R.S.
Director, Medical Research Council otological research unit, National Hospital, Queen Square, London.

JEAN MACIVER MACKINTOSH, M.D. Glasg.
Administrative medical officer of health for maternity and child welfare, Birmingham.

O.B.E. (Military)

Lieut.-Colonel WARREN JOHN BOYD, E.D., M.B., R.N.Z.A.M.C.

Lieut.-Colonel DENIS HENRY DRYBURGH BURBRIDGE, M.R.C.S., R.A.M.C.

Group-Captain ROY BRASMERE DAVIS, M.B. Melb., R.A.A.F.

Wing-Commander FREDERICK LATHAM, M.D. Manc., R.A.F.

O.B.E. (Civil)

BASIL GEORGE BROOKE, M.D. Dubl.
Chairman, Medical Board, Manchester, under the National Service Acts.

ALEXANDER MACKAY CALDER, M.B. Edin., F.R.C.S.E.
Surgeon, Newtownards Hospital, Co. Down.

HERMAN ROBERT FREDERICK, M.B. Edin.
General practitioner, Port Talbot.

ERNEST WIGHTMAN GINNER
Physician, Sunnybank Hospital, Cannes.

STANLEY AUGUSTINE MCDONNELL, CH.M. Sydney
For services to the community in the Balonne area, Queensland.

ALASDAIR MCKELVIE, M.B. Edin.
Lately specialist leprologist, Ghana Ministry of Health.

LILY MARGARET O'HANLON, M.R.C.S.
Head of Pokhara Mission Hospital, Nepal.

CECILY MARY WISE PICKERILL, M.B. N.Z.
Formerly plastic surgeon, Wellington Hospital, New Zealand.

ROBERT MERRICK LLOYD STILL, M.R.C.S.
Medical superintendent, Mental Hospital, Barbados.

ERIC BLAKE WILD, M.B. Lond., F.R.C.S.E.
Doctor-in-charge, Church Missionary Hospital, Isfahan.

M.B.E. (Military)

Squadron-Leader CHARLES JOHN WILLIAMSON SOUTAR, M.B. Lond., R.A.F.

M.B.E. (Civil)

CHARLES DONALD FERGUSON, M.B. Glasg., J.P.
For political and public services in Ross and Cromarty.

ARTHUR STEPHEN GARRETT, M.B. Lond.
Medical officer, Leprosy Service, Eastern Region, Nigeria.

GAVIN MUIR, M.B. Glasg.
Member, Medical Board, Newcastle, under the National Service Acts.

In England Now

A Running Commentary by Peripatetic Correspondents

WHY are we doctors often so unpredictable? Why does our attitude to our patients vary so much according to their environment? Of course I had always realised that a few doctors were inclined to treat their patients in hospital like rather deaf overgrown children, but *I* certainly didn't. However it has been brought home to me very kindly but pretty plainly that perhaps I am no better than the rest.

My patients, two rather charming elderly ladies, had been to see a physician in his consulting-room and were delighted with the way he carried out the examination. In fact we united in saying what a thoroughly nice person he was. But then came the pill in the jam. "Why, doctor," they asked me, "is he so different when you are an inpatient in hospital? He shouts across the ward. He is always in a hurry. His actual treatment is above reproach, but you are no longer a person, you are just a number, and when tackled he admitted it himself." I murmured the usual platitudes and left it at that. But later I remembered that at different times both these old ladies had been in hospital under me, and how had I treated them? Certainly not as I treated them when I visited them at home. I had asked them questions but had looked to the nurses for a reply. I had prescribed treatment but had left it to the Sister to explain what it was meant to do. I had spoken to them from the foot of the bed. It is easy enough to say that I find a hospital ward inhibiting, to blame the hospital staff, and feel that they tend to serve the patient up to us rather like a broken piece of machinery which, acting on our instructions, they are endeavouring to clean up, polish, and put in working order. They appear to resent a request to leave us alone with the repaired article, and on busy days it is easier to acquiesce, to talk over the patient's head, to forget that removal from home to hospital has not changed an intelligent person into someone who is unable to hear easily or answer questions.

My patients never hinted that they thought I was at all to blame. They are kinder than their doctor and would not hurt my feelings for anything; but it made me think, and what I thought wasn't exactly pleasant.

* * *

Twenty years ago, the gynæcology in my hospital was done by the general surgeon, because there was no gynæcologist at that time. The theatre nurse was one of the loveliest girls I have ever seen: she was known as "the houseman's heartbreak", and her beauty was equalled by her competence. I was engaged in the removal of two ruptured dermoid cysts; the cyst wall was adherent to both large and small intestine. Finger dissection was impossible, and the precarious process of separating the adhesions at the point of a sharp scalpel was arduous. At last I got the operation successfully completed, and closed the skin, remarking somewhat sententiously to the nurse, "Well, Nurse, *finis coronet opus*, if you know what that means." She replied, "Yes, Sir," and I asked, "Well, what *does* it mean, Nurse?" She answered, "I don't know any Latin, but I suppose it means it looks all right when the skin is closed."

* * *

Maybe I do look a square to the hep cats. Theirs is a hasty judgment. My bathroom mirror would tell a different tale; a more curvaceous profile would be hard to find, if you are not too fussy about segmental distribution. Anyway, a man should carry all before him with a permanent dignity of mien denied to the overpublicised fallout of the film stars, or his more transient competitors in the third trimester of expectant joy. But the hep cats are more scornful of my mind than mere flesh. It is positively indecent that Father should still have a yen to dig that crazy rhythm, and frantically pathetic when I try. Five stone and thirty years ago was where I came in, with my Oxford bags boring holes through the ballroom air. The bags are now under my eyes, the fireside chair needs re-springing, but somewhere up in the frontal lobes the old arterioles jive into spasm when the offbeat pulses stir up the past. Skiffle sends me. Sends me back, not only to the sentimental memories of the sweetest music this side of Heaven and the decorous gaiety of swing, but schizophrenically back to the half-lit cellars of Harlem, the throbbing primordial drumbeat, that curious scent, the dime-a-dance magnetic contact with inborn basic rhythm. No, Siree, only the years elbow me out of the groove. But I am fighting back.

As I mushroom over the bar stool, swilling the talc dust from my tonsils, and doing a surreptitious hand jive, I think how unenterprising are the youth of today. Their terminology is so boringly monotonous. If they have chosen to call themselves hep cats, why stop there? There is the whole range of veterinary pathology to give descriptive colour to their convulsions. Encephalomalacia has a pleasant syncopation in its own right, but they could really go to town on its synonym, crazy chick disease. What scope for the pop singer to shriek in his opisthotonos "Dig that crazy rhythm, Chicks, I've crazy chick disease." And the touching euthanasia of his partner's request to be put down forthwith. Strychnine seems to be doing the job quite adequately: cyanide would be too good for some of them.

Localised copper deficiency is just inviting swayback at midnight ballroom orgies. Beware of the hep with hepatitis, foot-stab is the recognised treatment in the best veterinary and chuckerout circles. Foot-and-mouth is the cry for song and dance in the cabaret: foot-rot marks the sitters out. Surely a cysticercus would be a more attractive title than a jam session on a tape recorder, and much more hospitable. If the idea catches on, just think of the vibriosis on the floor, the warble of muted clarinets, the curled tongue trumpeters, the push and pullorum of jiving, the free range, the coolness of the cats. Those kids don't know they're alive yet. Wait till my new diet melts the corners off. I'll show them I'm no square.

* * *

On my last flight home from New York altitude went to my head and British reserve forsook me. There were, of course, extenuating circumstances, for the lady who took the seat beside me was at least 70 years old and travelling alone. Courtesy dictated that I should help her in every way. She had flown in from San Francisco and was going on to Mainz, her home until 1906; her command of the English tongue could hardly have improved since. My respect for her grew as she ordered a manhattan from the stewardess, but there lay my undoing—or was it perhaps the bourbon I had taken myself—for as the stewardess reappeared I offered the second, which to my surprise she accepted. Her tongue was loosened and her life story unfolded. Fifty years a chiropractor! Case-history followed case-history against the tamponade of aero-engines—worse than any surgical meeting. There was the governor of Alaska's daughter cured of blindness by cervical manipulation, and the lack of consideration in her husband who chose to be acromegalic without deviation of the spine. He died—and deserved to, or so I seemed to detect. Each case-history ended with the moral, monotonously drawn, "We must not jump at conclusions."

Chiropraxis now has a firm grip upon San Francisco; but it had not been without a struggle, for those villainous doctors (how thankful I was that I had not slipped so far as to reveal my profession) had done all they could in an endeavour to make it illegal. Eventually victory had been easy. Deft manipulation of the cervical spine had cured a boy who hitherto had squinted like an owl. It was only necessary to send him round the town to gaze each citizen straight in the eye, while at the same time displaying an early school photograph, for all prejudice to be overcome. The chiropractic law was passed.

I was thankful when we passed into cloud which disturbed our even flight. The flow of words gradually ceased, a hand moved surreptitiously to handbag and a *pill* was passed quickly into her mouth.

* * *

Overheard in outpatients (as chest physician wearing red goggles walks through to the X-ray department)—"Look, Mummy, that spaceman from Mars smiled at me."

Letters to the Editor

THE PLACE OF HUMAN BIOLOGY IN MEDICAL EDUCATION

SIR,—I read Dr. Tanner's article of June 7 with considerable interest. I have two objections, however, to his preclinical curriculum: it is too long and it is too vague. By the end of his second year the medical student should be ready to commence his clinical course and he should begin it with a sound knowledge of the development, structure, and normal functioning of the particular and peculiar creature on whom he is going to practise his skill as a doctor.

There is no sensible reason, although there are plenty of "academic" reasons, why he should not commence his anatomy, physiology, and biochemistry as soon as he enters the university. For all practical purposes he will have done enough chemistry and physics and general biology at school. Most of Dr. Tanner's curriculum could be included in a revised and reformed anatomy and physiology course extending over a two-year period, but however useful a knowledge of cellular biology, genetics, evolutionary theory, constitutional variability, and the use of statistical method may be, an accurate and complete knowledge of gross anatomy and of the basic functions of the body is essential. This does not mean that a great deal of detail could not be removed from the textbooks, but what is retained must be taught well and understood at the time it is being taught. I agree that further detail can most usefully be added later in relation to whatever specialty has been selected by the student, but this also applies to the whole content of the preclinical course.

A great deal of our present trouble is due to the tradition of teaching subjects such as anatomy, pathology, and biochemistry in water-tight compartments. Once these subjects are introduced into the curriculum they should remain in the curriculum and continue into postgraduate studies, but, as in other spheres, the method and timing of the introduction is very important. Once the essential framework of a logical and not over-ornate curriculum has been established there is a place for various subsidiary activities such as films, visiting lecturers, inter-departmental "brains trusts", &c., but these should not be looked upon as a means to make the fundamental process of learning the basic subjects more attractive. Grammar must come before rhetoric, and sound accurate knowledge must not be smothered in a foam of scientific enthusiasm.

The construction of a revised and up-to-date curriculum requires new textbooks written not in isolation but as units of a curricular library, and especially new teachers who take their responsibility as teachers as seriously as they take their research work or their clinical duties. The art of great teaching must be restored to its proper place. Teachers and textbooks can both be produced in time, providing a whole medical school is willing to attempt the experiment as a team, but there is little hope of much improvement by a process of uncorrelated departmental tinkering. We have been at that long enough.

Department of Anatomy,
The Queen's University of Belfast. JAMES H. SCOTT.

THE PREDICAMENT OF THE BLADDER

SIR,—The urinary bladder has a life of unparalleled hardship. In the male it is encumbered by the prostate: in the female it is buffeted by the fœtal head. Like many another mass-produced article, it is poorly finished—and substandard bladders with such obvious flaws as diverticula and ectopia vesicæ are still foisted on a long-suffering public.

The unfortunate organ is wantonly assaulted by the gynæcologist, the general surgeon, the urologist, the proctologist, the obstetrician, and the abortionist.

Germs, tumours, and stones flourish within it, and its seclusion is rudely disturbed by bits of wire, knitting needles, and sundry other objects introduced by owners who are perverse, inquisitive, or just plain careless.

Its double function, to hold water and yet to pass water, makes a paradox which often confuses the young and inexperienced bladder—but even veteran bladders may fail in their duty through no fault of their own. To be incontinent, that is a misfortune which the bladder accepts with sardonic stoicism, only sorrowing at the misery which its defection may bring upon a kindly owner, upon a master who has treated it well. But retention: that is the culminating, and the cruellest, blow. Long and bitter experience has taught the bladder that this dread event is a herald of doom. It cries aloud in its agony and fear, and it will not be comforted. Neither faith nor potions will avail it now. The surgeon, and only the surgeon, can put an end to its torture.

Here, perhaps, is a dictum of our craft: "an obstructed tube is the only absolute indication for surgery". It matters not whether the tube is urethra or gullet, ureter or bowel, blood-vessel, windpipe, or bile-duct. We have no choice in this surgical variant of Hobson's Law.

It is curious that the bladder, in this moment of its greatest need, when it comes before the surgeon as a suppliant, should seek, so often, to deceive him. It is not above masquerading as an ovarian cyst, a pelvic abscess, or even a pregnant uterus. Two cases of this base ingratitude have recently come under my care.

The first was a man of twenty-seven who was admitted with pain in the perineum, high fever, and a bladder distended to the umbilicus. Small quantities of urine could be voided, with pain and difficulty, if he adopted the knee-elbow position. An X-ray showed a rounded opacity one and a quarter inches in diameter at the base of the bladder.

The patient was returned to the X-ray department with a request for oblique and confirmatory views of the "vesical calculus". No further radiographs were taken, but I was courteously reminded that the penis, photographed end-on, throws a circular shadow approximately one and a quarter inches in diameter!

The patient's retention was reflex, and his perineal pain was due to osteomyelitis of the sacrum. I subsequently drained half a pint of pus from behind his rectum and above the levator ani. The pus grew *Staphylococcus aureus*, and his convalescence was uneventful. He passed water normally from the seventh postoperative day.

The second patient was a sixty-year-old man who had passed no urine for forty-eight hours. His prostate was palpably enlarged and the distended bladder could be felt above it.

He was (and, curiously enough, still is) a Christian Scientist, and at first declined all aid. However, we felt that time was on our side, and a little later he allowed us to withdraw forty ounces of urine from his exasperated bladder. This was his only concession and he adamantly refused any operative interference.

For a week we eyed each other with mutual hostility. The catheter was removed on several occasions, but no urine escaped; the pain returned; the bladder was again palpable at the umbilicus. He then agreed to operation, provided that we would take a second opinion from Mr. X, his Christian Science practitioner. This we did, and a pretty bizarre opinion it was! Nevertheless, I feel bound to admit that Mr. X's views on the pathogenesis of this particular malady were no more absurd than my own.

When the patient was brought to the theatre, his bladder was still distended to the umbilicus, a phenomenon which we attributed to the withdrawal of his catheter some hours earlier—as a prophylactic against any last-minute repentance. A mid-line incision exposed a large swelling which was clearly not the urinary bladder. The peritoneum was opened, and the swelling

proved to be an enormous cyst, filling the pelvis and squashing the unfortunate bladder into the left half of the abdomen. The cyst was removed without any great difficulty, and was shown to have originated in a presacral neurofibroma. The bladder, relieved of its unwelcome neighbour, at once resumed its functions.

I hope your readers will agree that there are several morals, as well as an extraordinary number of mixed metaphors, in this narrative.

Barnet General Hospital, Barnet. V. J. DOWNIE.

INTESTINAL ANGINA

SIR,—I was very interested in your leading article of June 7. I must, however, take exception to your statement in the first paragraph—" and they must not be confused with the common abdominal radiation of cardiac anginal pain ".

Cardiac anginal pain very rarely radiates to the abdomen. Typically this is retrosternal and may radiate to either chest, shoulder, or arm. Less frequently it radiates to the jaw, and through to the back. I have paid particular attention to this radiation during the last five years. In only one case, proved at postmortem to have a cardiac infarct, did the pain radiate to the abdomen; even in this case there was a possible alternative explanation.

This is a very important feature of cardiac anginal pain. If it is accepted that this rarely radiates below the xiphisternum it becomes an extremely important differential diagnostic point.

Chichester. JOHN D. WHITESIDE.

SIR,—In reference to your editorial on " intestinal angina ", I should like to remark that what has been described recently by Mikkelsen under this term is the syndrome described many years ago by Professor Ortner and by myself and to which I gave the name of " intestinal angiospastic syndrome ". A new name does not mean a new disease, particularly when that name will cause great confusion in clinical work.

As I pointed out in my description,[1] the intestinal angiospastic syndrome occurs in individuals somewhat advanced in age and frequently after a prodromic period of vague abdominal disturbance. It consists in sudden attacks of acute diffuse abdominal pain reaching its maximum in about one minute, lasting some ten or fifteen minutes and accompanied in its last phase by tympanism and sometimes by pallor, acceleration of pulse, and even collapse. These attacks occur after meals when the digestive tube has been loaded with food, principally with foodstuffs producing gas through fermentation, and in some cases following exertion, mainly after meals. It has to be distinctly differentiated clinically from cases of angina pectoris with epigastric pain and it is for this reason that the terms intestinal or abdominal angina are confusing. I described the intestinal angiospastic syndrome as one of the syndromes manifesting atherosclerosis of the intestinal arteries, the other being acute mesenteric thrombosis which, in some cases, follows the attack of this angiospastic syndrome.

Enlarging on the study of Ortner I pointed out the coincidence, in both these syndromes, of manifestations of angina pectoris and of atherosclerotic obliterans arteriopathy of the limbs, such manifestations in some cases following each other in time, as in a case described in collaboration with Dr. Catsaras in this journal.[2]

The work of the American authors you quote is important in directing our attention again to intestinal atherosclerosis and particularly in indicating the possibility of surgical treatment. It is, however, necessary to stress the significance of the original clinical descriptions and to maintain the original terms through which the confusion with angina pectoris with epigastric pain is avoided. Precision in terms is essential in clinical medicine.

London, W.1. A. P. CAWADIAS.

1. Cawadias, A. P. Diseases of the Intestines; pp. 229–232. London, 1927. *C. R. Soc. Biol. Paris*, 1922, **74**, 591.
2. Cawadias, A. P., Catsaras, J. *Lancet*, 1923, i, 949.

ADRENALINE CREAM

SIR,—I was surprised to read that Dr. Hume Kendall and his associates (May 17) had expended so much effort in proving that adrenaline cream is ineffective in the treatment of degenerative arthritis of the spine. I have never suggested, as Dr. Kendall seems to believe, that the cream relieves the rheumatic syndrome by producing hyperæmia or analgesia when applied locally. I have consistently stressed that adrenaline cream works *only* if it is applied to the myalgic or " trigger " spots of muscles in a state of spasm, when it relieves the pain of " fibrositis " and other forms of soft-tissue rheumatism.

Since Good [1] first drew attention to them, the existence of trigger spots and their capacity to cause pain and disabilities commonly designated as " rheumatic " have been confirmed by several independent workers, notably by Bonico.[2] Yet in those extensive trials of the cream which have given negative results, the treatment has never been applied to the myalgic spots.[5]

Surely it is essential for the evaluation of any therapy that trials should be carried out in the manner indicated in the primary research. As yet—after a decade—this has not been done, except by Howell,[4] who obtained a positive result.

May I suggest to Dr. Kendall and to others interested in the treatment of the chronic rheumatic diseases that if further trials are contemplated, the technique of treatment should be the one I have described.[5]

London, W.1. LOUIS MOSS.

COLOURED TABLETS

SIR,—The practice of colouring and coating pharmaceutical tablets has grown considerably during recent years, especially among companies which have begun to operate in Britain from overseas. The *British Pharmacopœia* has hitherto resisted the inclusion of colour and coating except for good pharmaceutical reasons, such as protection against deterioration or the masking of unsightly colours in the natural material.

The manufacturers claim that the improved elegance achieved justifies the new practice, and they also claim that it is necessary to enable the industry to compete in foreign markets. So strong has this pressure become that the *Pharmacopœia* has now had to take the course of admitting the manufacturer's tablet, coating, colouring, and all, or not have it in the *Pharmacopœia* at all.[6]

Some of us believe that the colouring and coating of tablets and capsules, except for the reasons formerly accepted, increases the danger of poisoning among children, though proof of such an assertion is difficult to obtain.

A preliminary experiment was recently carried out in the Westminster Children's Hospital along the following lines:

' Smarties ', a brand of coloured sweets favoured by most children, were segregated into their constituent colours and offered, along with some specially prepared white ones, to

1. Good, M. *Lancet*, 1940, ii, 237.
2. Bonico, J. J. *J. Amer. med. Ass.* 1957, **164**, 732.
3. Moss, L. *Med. Wld.* 1951, **75**, 288.
4. Howell, T. H. *Lancet*, 1950, ii, 395.
5. Moss, L. Rheumatism and You. London, 1955.
6. See *Lancet*, April 5, 1958, p. 726.

children attending the clinics. The dishes contained equal numbers of tablets and were randomly arranged on the tray. The number of each taken during the experimental period was:

Red	209	Orange	185	Brown	152
Black	145	Pink	132	White	132
Green	114	Mauve	111	Yellow	106

If white is regarded as a colour, the only marked preference is for red and orange.

In a second experiment, a dish of mixed smarties—the normal assortment—was offered alongside white ones. In this case the preference for the coloured tablets was of the order 2 : 1.

It is true that the smarties are known and appreciated by the children and this gives a bias against an unknown white commodity; but it does seem reasonable to conclude that the more one makes medicinal tablets look like smarties, the more likelihood there is of children taking them.

Experiments of different design are being prepared to remove some of the bias this preliminary experiment obviously has, and these we hope to publish in due course.

Westminster Hospital,
London, S.W.1. HERBERT S. GRAINGER.

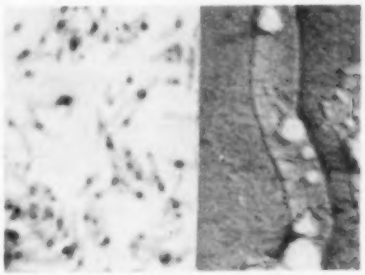
*** We publish on p. 1308 a paper by Dr. Jolly and Dr. Forrest describing the results of an experiment with coloured tablets.—ED. L.

STRUCTURAL DETAILS IN MYCOBACTERIA AFTER HYDROLYSIS

SIR,—The presence of soluble material (cytoplasm and external lipid layer) in the cells of mycobacteria has been held responsible for the difficulty in discerning morphological details within the cell.[1] A method is here reported by which an insoluble specifically inert material containing undamaged cell walls and electron-opaque granules, was isolated from *Mycobacterium tuberculosis* after removal of the unstructured soluble cellular material.

An eight-week-old culture of *Myco. tuberculosis* H_{37} R_V grown in glycerin-broth, was heated for 30 min. at 120°C and then harvested in 10 volumes (w/v) of *N*KOH solution and incubated for 2 hr. on a boiling water bath under a reflux condenser. The homogeneous highly turbid suspension that resulted after heating was washed with *N*KOH solution in the centrifuge (15,000 *g*) and the white residue allowed to digest with trypsin for 12 days at 37°C under toluol.[2] The remaining insoluble material was washed with distilled water by centrifuging at 18,000 *G* and extracted with 50 volumes (*w/v*) of formamide for 6 hr. at 100°C. The stable suspension was separated in the centrifuge (20,000 *g*), washed and resuspended in distilled water. The insoluble fraction obtained in this manner contained 10·5% nitrogen, 7% carbohydrates, and 17·9% ashes. It represented 0·3% (dry weight) of the original bacillary material and was specifically inert when tested in vitro or in the animal (work to be published).

Examinations of the insoluble fraction showed, as revealed in the light microscope after staining,* non-acid-fast, transparent bacillary bodies which stained faintly pink with Ehrlich's dye and contained one or several metachromatic dark violet granules (fig. 1*a*). By comparing the electron-micrograph of the insoluble fraction (fig. 1*b*) with the images previously obtained by direct or ultra-thin section examinations of mycobacteria[3 4], it may be seen that the treatment resulted in a strikingly increased permeability of the bacterial body to the electron beam. The cells appeared like "flat collapsed sacs" which obviously represented the bacterial cell walls, and contained well-defined opaque granules resembling in shape and disposition the metachromatic granules viewed in the light microscope. The alkali-trypsin-formamide-resistant granules, staining metachromatically and electron-opaque, can obviously be identified with the "volutin-metaphosphate" granules recently studied by Glauert and Brieger.[5]



(*a*) (*b*)

Fig. 1—Insoluble fraction: (*a*) photomicrograph (×2500); (*b*) gold-shadowed electron-micrograph (×15,000).

A significant result concerning the intimate structure of these granules was noted when the insoluble fraction was subjected to a suitable treatment for 6 hours at 65°C with 0·5 *M* trichlorate acid and examined by the light and electron microscopes. Fig. 2† indicates that the metachromatic granules were thoroughly dissolved out in trichloracetic acid, while under the electron microscope there was no detectable change under these circumstances. "Volutin" granules of mycobacteria are, therefore, not homogeneous; they contain at least two chemically separable constituents carrying respectively the metachromatic and electron-opaque characters.

(*a*) (*b*)

Fig. 2—The insoluble fraction after trichloracetic-acid treatment: (*a*) photomicrograph (×2500); (*b*) gold-shadowed electronmicrograph (×8500).

Cantacuzino Institute,
Bucharest, Rumania. G. G. GANCEVICI.

UNEXPLAINED FACIAL SPASM

SIR,—Recently I was confronted with a curious case of facial spasm.

A girl of 10 was referred to the Birkenhead Children's Hospital with a spasm consisting of depression of the mandible and retraction of the tongue, beginning an hour after extraction of two left lower molars two days before. Deglutition was possible, but not mastication. There was no other spasm, and no history of recent injury. Dislocation of the jaw was excluded.

On examination, the child could not move the jaw or tongue. Chvostek's sign was positive on both sides in the distribution of the mandibular division of the 5th nerve. Trousseau's sign was negative, and there was no carpopedal spasm. Serum-calcium was 10·2 mg. per 100 ml.

The condition gradually abated over the next three days, after which the child could eat normally. Chvostek's sign persisted for five days.

It was suggested that the increased nervous irritability may have been due to facilitation at the synapses of the

1. Knaysi, G. *Ann. Rev. Microbiol.* 1956, **74**, 12.
2. Pillemer, L., Blum, L., Lepow, I. H., Wurz, L., Todd, E. W. *J. exp. med.* 1956, **103**, 1.
3. Mudd, S., Takeya, K., Henderson, N. J. *J. Bact.* 1956, **72**, 767.
4. Toda, T., Koike, M., Hisaki, N., Takeya, K. *ibid.* 1957, **73**, 442.
5. Glauert, A., Brieger, E. *J. gen. Microbiol.* 1955, **13**, 310.

* Selective staining for both cell walls and granules was performed as follows: smears were fixed for 2 min. in 1% osmic acid, washed in running water and treated for 5 min. with an aqueous freshly prepared solution containing 15% tannic acid and 10% K alum. After rinsing in distilled water, Ehrlich's aniline crystal violet was poured onto the slide and incubated for 10 min. at 37°C. The stained smear was passed to water again, then Lugol's iodine solution was added (3 min.); it was finally rinsed in distilled water.

† Kindly made by Dr. A. Petrovici and Ing. R. Davidescu.

reflex arc, involving the trigeminal and facial nerves, and brought about by the persistent stimulation of the former nerve.

Any other explanation of this unusual sign would be welcome.

Ormskirk County Hospital, Ormskirk, Lancs. WARREN DURRANT.

ESSENTIAL FATTY ACIDS, LIPID METABOLISM, AND ATHEROSCLEROSIS

SIR,—Our interest was aroused by the article by Dr. Kinsell and his colleagues (Feb. 15).

Though we are not convinced of the cholesterol-depressing action of essential fatty acids in relation to atherosclerosis, our own observations confirm some of the propositions of Dr. Kinsell and his colleagues. There is some evidence [1] of the direct conversion of linoleic to arachidonic acid: we therefore used soybean oil, one of the richest sources of linoleic acid. Meanwhile it appears [2] that the favourable cholesterol-depressing effect is limited to linoleic and arachidonic acids.

10 patients (8 men and 2 women) with hypercholesterolæmia were investigated. In 8, signs of coronary sclerosis were found (myocardial infarction, angina pectoris). 2 had hypercholesterolæmia without any clinical symptoms of vascular lesions. In 3 patients the disease was complicated by diabetes, in 1 by hypertension. The average age of the patients was 55·5 years.

The first week after admission was a control period and the patients received a diet similar to the one they were accustomed to. Blood samples were taken twice during this period.

6 patients (group *a*) then received a diet providing 30 calories per kg. of ideal body-weight, fat yielding 30% of the calories, protein 18%, carbohydrate the remainder. All free fat was supplied as soya oil. The vitamin-C intake was about 100 mg. a day. 4 patients (group *b*) received a diet isocaloric with that of the control period, but all free fat was supplied in the form of soya oil. The average oil intake was 41·5 g. a day.

9 patients had this treatment for five weeks, and 1 for eleven weeks; and 1, as an outpatient, for ten weeks.

1. Mead, J. F., Howton, D. R. *J. biol. Chem.* 1957, **229**, 575.
2. Hegsted, D. M., Cotsis, A., Stare, F. J. *J. Nutr.* 1957, **63**, 377.

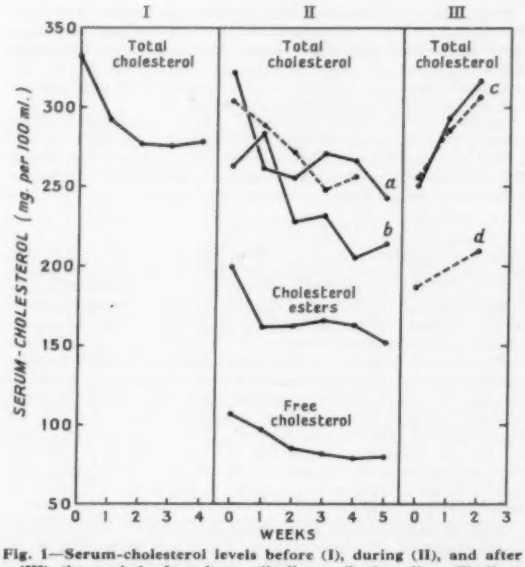


Fig. 1—Serum-cholesterol levels before (I), during (II), and after (III) the period of soybean oil diet. Broken line: Findings in patient taking olive oil. *a*, *b*, *c*, *d*: see text.

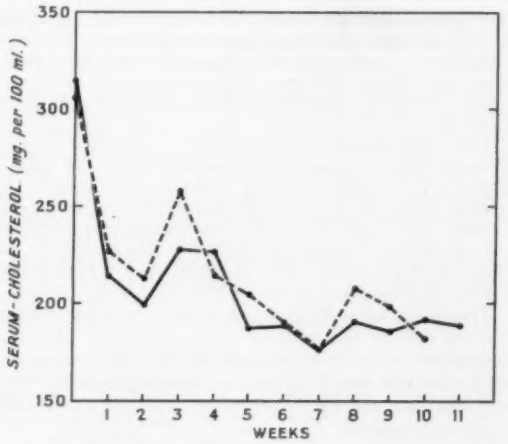


Fig. 2—Serum-cholesterol changes in outpatient (broken line) and hospital patient (continuous line).

4 patients with hypercholesterolæmia who were admitted to hospital but did not receive the soya oil served as controls. In another patient the soya oil was replaced by olive oil.

The serum-cholesterol in the control patients reached a somewhat lower level than the initial values. In the group receiving the soya oil (fig. 1) an obvious fall in the serum-cholesterol level was noted, which persisted throughout treatment. There was no substantial difference between groups *a* and *b*. 2 patients were followed after the dietotherapy had been stopped and a rise of the serum-cholesterol was noted, though in one patient (*d*) the caloric value and fat content of the diet remained unchanged and in the second patient (*c*) the caloric value of the diet was even reduced from 2700 to 1800 calories, and the fat content from 95 to 65 g., but the soya oil was replaced by animal fats.

All our patients receiving the soybean oil felt better, though the blood-coagulation and the lipoprotein pattern remained unchanged. A shift of the lipoprotein fractions from beta to delta was insignificant. We think that the analogous results obtained in an outpatient exclude the possible effect of bed rest and other non-dietary factors on the cholesterol level (fig. 2).

Institute of Human Nutrition, Prague, Czechoslovakia. J. VAVŘÍKOVÁ.

PREMEDICATION FOR OUTPATIENT ELECTROCONVULSION THERAPY

SIR,—Electroconvulsion therapy (E.C.T.) for specific mental illnesses is being increasingly used with success in outpatient departments, not only in order to save patients admission to hospital but also to allow them to continue their work whilst receiving such treatment. Further, if given in a general hospital it is acceptable to people who, although in urgent need of it, could not accept what they regard as the " stigma " of attending or entering a mental hospital.

In spite of these advantages, however, there remains the very real problem of the apprehension and anxiety which precedes E.C.T. even when modified with thiopentone and suxamethonium chloride, as is our practice. It was to deal with this problem that a small clinical trial was carried out; and, although no control group has yet been studied, the results achieved were of great practical value.

30 patients, all attending for outpatient E.C.T. at a general hospital and all complaining of such pretreatment anxiety

and apprehension (all having had one or more modified E.C.T.s) were given a small supply of methylpentynol carbamate ('Oblivon C'), with instructions that on the morning of treatment, two 'Ovets' (200 mg.) should be taken on rising and two more about an hour before attending hospital—i.e., about 1.30 P.M.

There was a striking improvement in the attitude of most of these patients. Grading of their reactions was rated as "much improved", "improved", "no change", or "worse". 20 patients claimed to be "much improved", 8 more were "improved", only 2 patients felt no different, and none felt worse.

I am aware of the failings of such a trial, both from the smallness of its numbers and the absence of a control group. These will take time to rectify, although it is hoped to do so.

The importance of these apparently excellent results lies not only in the relief of the pretreatment fears but also in the fact that patients urgently requiring such treatment now feel able to accept it, whereas previously their very real fear and terror prevented them from doing so. Hence this letter.

Hellingly Hospital,
Hailsham, Sussex. J. F. COLLARD.

WORLD HEALTH ASSEMBLY

SIR,—In your note of June 7 on the tenth annual commemoration session of the World Health Organisation, you report that Dr. Brock Chisholm, lately director-general of W.H.O., said that the Organisation had come to be widely recognised for efficiency. This was, he thought, due to the unique character of the Executive Board, whose eighteen members act purely as health experts and not as representatives of governments: "Any attempt to convert the Executive Board into a political body would threaten the future of the Organisation".

Some considerable experience in the conduct of small voluntary associations leads me to believe that those responsible for such associations are likely to achieve efficiency similar to that of W.H.O., on its more important level, whenever they adopt the expedient of accepting guidance from advisors not primarily concerned with authority.

Braziers Park,
Ipsden, Oxon. J. NORMAN GLAISTER.

A USEFUL ACCESSORY SUTURE

SIR,—I think it might interest people to know about a little procedure or "dodge" I have used for many years to facilitate the removal of sutures. It is particularly useful in children, and has come through many years' trial very satisfactorily.

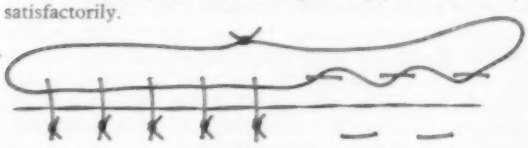


Fig. 1—Continuous thread in position.

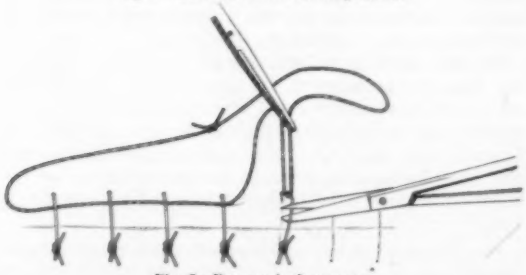


Fig. 2—Removal of sutures.

A continuous thread of a material different in texture and colour from that used for the skin suture is passed under each skin suture. The thread therefore runs parallel with the incision and lies quite loosely in between each two sutures (fig. 1). Removal is facilitated (fig. 2), the effect of the œdema round the sutures is completely offset, and, even in a poor light, sutures may be removed quickly and painlessly even in a very young or very nervous patient.

Liverpool, 1. BRYAN MCFARLAND.

PROTHROMBIN ESTIMATION BY THE TWO-STAGE METHOD

SIR,—Dr. Wright and his colleagues (May 31, p. 1157) report evidence of slow coagulation when heparinised blood circulates through an extracorporeal bypass. Fibrinogen concentration, antihæmophilic activity, and the platelet-count all fell to about half their normal values. However, the prothrombin, estimated by the two-stage area method of Biggs and Douglas,[1] showed a striking initial increase.

It may not be sufficiently realised that results obtained by this method are directly comparable only if the fibrinogen concentration and the activity of progressive antithrombin are each identical in the plasma samples tested. Where they differ, corrections must be applied to the results (as area-units observed) before the comparisons are made.

Fibrinogen concentration.—It is well known that when blood clots, some thrombin is removed by fibrin. Hardisty and Pinniger [2] added varying quantities of purified fibrinogen to the plasma of an afibrinogenæmic girl, and found that about half the thrombin liberated was bound by the normal range of fibrinogen concentration and would thus remain undetected in tests on normal plasma. Their data show the thrombin area observed to be linearly related to the square-root of the fibrinogen concentration (w/v); the observed area fell by 2·2 thrombin mins. per root mg. % increase in the fibrinogen concentration in the reaction.

From the theoretical model discussed below, it may be anticipated that the slope of this regression would vary inversely with antithrombin potency, and it is possible that deficiency or excess of prothrombin might also affect the relationship, and thus further complicate the interpretation of the test. Without further investigation, it does not seem possible to calculate the appropriate corrections.

Progressive antithrombin.—Biggs and Douglas [1] based their area method on the close correspondence between observed two-stage curves and a theoretical model derived from consecutive first-order reactions; they were careful to point out the implication that the area under the curve will not provide a measure of prothrombin "unless the level of antithrombin is normal".

Imagine an effectively first-order system containing a finite quantity of prothrombin (measured in equivalent thrombin units), a, with thromboplastin and antithrombin, supposedly in excess and therefore constant, denoted by P and A respectively. Then the concentration of thrombin, y, at time t is given by:

$$y = \frac{aK_1}{K_2 - K_1}\,(e^{-K_1 t} - e^{-K_2 t})$$

where $K_1 = k_1P$ and $K_2 = k_2A$, k_1 and k_2 being the reaction constants. The area under the curve relating thrombin concentration to time is a K_2, and is thus inversely proportional to A. The relevant measure of antithrombin is not, of course, the total quantity of thrombin which can be destroyed by the plasma in unlimited time,[3] but the rate at which thrombin decays.

Therefore, to correct for differences between A_C and A_T (the antithrombin in the control and test plasmas respectively), multiply the test area by K_T/K_C, the observed rates of decay of thrombin added to test and control citrated plasma respectively,[4] which are estimates of K_2 for the two plasmas. The decay is exponential, so that log. thrombin concentration is linearly related to sampling time, and the slope of this line (the fall in log. thrombin units per unit time, say K log. units per min.) is the required measure of antithrombin activity.

1. Biggs, R., Douglas, A. S. *J. clin. Path.* 1953, **6**, 15.
2. Hardisty, R. M., Pinniger, J. L. *Brit. J. Hæmat.* 1956, **2**, 139.
3. Astrup, T., Darling, S. *Acta physiol. scand.* 1942, **4**, 293.
4. Quick, A. J. The Physiology and Pathology of Hæmostasis; pp. 164–165. London, 1951.

The position is a little complicated by Seegers'[5] finding that part of the antithrombin activity (antithrombin IV) can be demonstrated only during the conversion of prothrombin to thrombin, and so could remain undetected by this procedure. However, we have been able to compare the rates of decay of thrombin added to citrated plasma with and without the concomitant addition of brain extract and calcium chloride, and have not found significant differences. We believe that antithrombin IV may be ignored in determining the two-stage correction.

In slowly clotting plasma we have found little change in serial estimates of K. The second correction is therefore probably unimportant in the bypass experiments, but the fibrinogen effect should obviously be allowed for since the fibrinogen concentration fell markedly during the period of observation.

Dr. Wright and others confirmed their anomalous prothrombin results by the acid-precipitated-globulin method.[6] Unfortunately, we have found that the "globulin" precipitate also contains fibrinogen (in one experiment, about a quarter of that in the original plasma), so that variations in plasma-fibrinogen concentration may well be reflected in the fibrinogen content of the solution prepared from the precipitate.

We therefore feel that the observed increase in prothrombin during slow coagulation is probably more apparent than real, and we would be interested to learn whether the authors feel that it is explicable on the lines we have suggested. Of course, we fully accept the main conclusion that slow coagulation was occurring in the bypass.

Louis Jenner Laboratory,
St. Thomas's Hospital and Medical School,
London, S.E.1. G. I. C. INGRAM.

Medical Research Council's Statistical Research Unit,
London School of Hygiene and Tropical Medicine,
London, W.C.1. P. ARMITAGE.

PHYSICAL CHANGES IN THE PROLAPSED DISC

SIR,—I should like to comment briefly on your annotation of June 7.

Attrition of the annulus is only one of the results of decreased imbibition pressure in the nucleus, and possibly not the most important one, as hydrostatic effects most certainly occur as well. It seems to me, on the basis of the work to which you refer, unnecessary to postulate a hyperhydration of the nucleus, particularly as this has never in any case to my knowledge been satisfactorily demonstrated, and as the inefficiently functioning nuclear gel will itself produce precisely these effects because it reacts to increased pressure by liberating an abnormally large quantity of fluid. It is this, I think, which is responsible for successive ruptures of the already weakened annulus, and clinically for the acute attacks of pain which are common on the patient's first moving after a period of rest.

The difference between the deterioration of the prolapsed disc and that of the physiological ageing disc is, as you imply in your annotation, a matter for further investigation. I have suggested that the orderly replacement of polysaccharide by collagen in the course of normal ageing could be the factor that prevents hydrostatic effects in the elderly. Investigations now being undertaken here by Dr. Peter Mitchell suggest that that will in fact prove to be the case. Significant changes have also come to light in the content and possibly the composition of the polysaccharide, which we hope to report in due course. Indeed, so many variables exist that I cannot share your difficulty in understanding why nuclear desiccation in the elderly should differ from that in the deranged disc. At the risk of perpetrating the inaccuracy that is inherent in all generalisations, one might perhaps say that the difference between normal and pathological ageing is that only the latter will prove to be pathological.

Royal Infirmary,
Aberdeen. NEIL G. C. HENDRY.

SIR,—In your annotation you quote Hendry's work on the hydration of the prolapsed disc, and go on to say: "If desiccation in discs is a major factor in their prolapse, it is difficult to understand why the elderly remain relatively free from major disc derangement." In the article you quote, you will find a plausible explanation.

Stresses through the vertebral body are balanced partly by imbibition pressure of the nucleus—the power to retain water which enables cacti to live in the desert and mushrooms to lift paving-stones—and partly by the annulus fibrosus. The nucleus consists of a lattice-work of collagen in which is embedded a mucoprotein gel which retains fluid by imbibition pressure. In the ageing nucleus the proportion of collagen increases and gel decreases.

As the imbibition pressure is reduced, the annulus bears a greater strain, and the character of this strain changes from alternating pressure and tension to a continuous force which may rupture the annulus and allow prolapse of the contained nucleus.

As ageing continues, the proportion of collagen rises further. Eventually the nucleus is completely fibrosed, and prolapse is virtually impossible.

Institute of Orthopædics,
London, W.1. I. G. MACKENZIE.

DEATH OF A BOXER

SIR,—Those of us who were at school nearly half a century ago were told that a sense of proportion was a good thing to acquire and keep.

People have been struck on the head by cricket balls and died therefrom. One of these, if memory serves, was a Royal Prince. No more cricket?

Necks have been broken playing rugger. I had one such in my practice and the patient died. No more rugger?

A tough doctor friend who won the inter-Hospitals boxing at both middle and heavy weight in the same competition played rugger for his university and cricket and tennis for his county, and for many years rode to hounds as if the devil was after him, came to no harm till, in riper years, he took to golf. Leaning over to scoop his ball out of a deep bunker he slipped and fell, dislocating his shoulder. Clearly, then, no more golf.

Meanwhile, of course, let there be no more mountaineering, steeplechasing, or polar exploration: all too risky.

Most of us, I suppose, die in bed. Perhaps we should sit up all night. Really, Sir, do we want, or expect, to live for ever?

Crediton, Devon. L. N. JACKSON.

SIR,—I find it difficult to appreciate the viewpoints of those who maintain that bashing the skull is good for it and those who have to carry out experiments on animals to show that injury to the skull is bad for it. Surely the whole design of the skull is such that the structures within it are protected against the normal injuries likely to be encountered in the ordinary rough and tumble of life, but that is no excuse for submitting it to deliberate trauma in the interest of sport.

If the general public cannot adopt a common-sense attitude towards boxing and demand its abolition, I suggest that they be asked to treat their skulls with the same respect that they treat their television sets. No-one in their right senses would deliberately hit a television set or box its aerials; yet, schoolmasters and parents continue to box children's ears and boxing is still taught as a means of self-defence, although wrestling is safer and more efficient. Moreover, as long as boxing is taught in schools and boys' clubs, professional boxing will continue to thrive.

At a recent debate on this subject held among patients at the Lancaster Moor Hospital I discussed the subject in this manner and the voting went in favour of boxing

5. Seegers, W. H., Johnson, J. F., Fell, C. *Amer. J. Physiol.* 1954, **176**, 97.
6. Douglas, A. S., Biggs, R. *Glasg. med. J.* 1953, **34**, 329.

being abolished by a small majority. One can only hope that they represented a cross-section of the general population.

Lancaster Moor Hospital. R. PAKENHAM-WALSH.

TIME AND THE NERVOUS SYSTEM

SIR,—Thank you for publishing Professor Woodger's definition of an A-line (June 7). I find it difficult to understand why Dr. Gooddy (May 31) should think it necessary to explain the well known—such as how a clock works or that joints are of two types (ball-and-socket or hinged)—and unnecessary to explain a difficult concept taken from a discipline different from medicine.

He makes some propositions that I am not clear about, such as "There is no system of knowledge about time, to compare with the advanced systems of biology, physics, and chemistry". I wonder is the concept of time comparable with the positive sciences (by which I mean systematised collections of facts) he mentions? Would the assertion "There is no system of knowledge about length or depth to compare with the advanced systems of biology, physics, and chemistry" have any point?

Not everyone would agree with his allegation that the interstate between neurology and psychiatry is neglected, nor that neurology lies at the junctional point of philosophy and science—is there such a junctional point? I cannot see how the neurologist, who may have no training or experience in psychology, psychiatry, semantics, logic, and philosophy can be claimed to be in the best position for the investigation of disorders of the time sense. Let me hasten to state I know several neurologists who seem to me to have a knowledge of these disciplines but as far as I can see they acquired it in spite of their training in neurology.

It may be that rhythmic activity of the nervous system is related to time appreciation. The electroencephalograph demonstrates such rhythmic activity but surely it does not prove any connection with time appreciation. On the contrary, alpha rhythm "which shows final abstraction from all other rhythms" disappears with visual activity but time appreciation continues.

Shenley Hospital, near St. Albans. RUSSELL BARTON.

THE CERVICAL AORTIC KNUCKLE

SIR,—In April, 1953, two of us reported [1] the case of a young man whom we had observed periodically since we first saw him, at five years of age, with a pulsating swelling in the right side of his neck, extending as high as the hyoid bone. Exploration at that time suggested that it was the arch of the aorta: following a second exposure a few months later the overlying deep cervical fascia was reinforced with fascia lata taken from the patient.

In 1953 it was noted that, since the operations thirteen years before, there had been no great change in the cervical aortic knuckle, which bothered him slightly if at all: he had been regular in attendance at his work as a storekeeper and had had no serious illnesses. In March, 1957, he was readmitted complaining of some difficulty in swallowing certain foods, such as potatoes and meat. The dysphagia had been present for about six months and was increasing. A vascular ring compressing the œsophagus was suspected and the evidence obtained by angiography supported this.

On April 2, 1957, left posterolateral thoracotomy through the bed of the fifth rib (H. R. S. H.) confirmed the diagnosis. The transverse retro-œsophageal segment of the aorta, the ligamentum arteriosum, and the right and left pulmonary arteries formed a vascular ring which fitted tightly around the trachea and œsophagus, the posterior wall of which was indented by it. The ligamentum arteriosum was tense, nearly an inch in length, and formed the left part of the ring extending from the left subclavian artery at its junction with the aorta to the left pulmonary artery at its junction with the right branch.

1. Lewis, C., Rogers, L. *Lancet*, 1953, i, 825.

After division of the ligament the constriction of the trachea and œsophagus was relieved and his dysphagia alleviated. He remains well and free from symptoms a year later.

In our first report of this case we drew attention to the condition of cervical aortic knuckle in a child. Recognition of its nature is important since it has been mistaken for an aneurysm and operated upon with fatal result. We have presented this further note because, in cases of abnormality of the aortic arch, it would seem reasonable to suspect the presence of an intrathoracic vascular ring which, by encircling the trachea and œsophagus, may in the course of time cause dysphagia.

A detailed discussion on the embryology of these cases will appear in an article by one of us (H. R. S. H.) shortly to be published in the *British Journal of Surgery*.

Surgical Unit, Welsh National School of Medicine, Royal Infirmary, Cardiff.
CECIL LEWIS
H. R. S. HARLEY
LAMBERT C. ROGERS.

Parliament

Proposed Amendment of Registration Procedure

ON June 11, under the ten-minute rule, Mr. JOHN HYND, a former member of the General Medical Council, asked and obtained leave to introduce a Bill to amend the Medical Act of 1956. The wording of that Act, Mr. Hynd said, had proved anomalous and the procedure it laid down cumbersome. The amendments proposed in his Bill would affect two groups of doctors: those who had qualified in this country before Jan. 1, 1953, but who for some reason had not applied for registration, and those who qualified in this country because they held foreign or Commonwealth diplomas not recognised for registration. Both these groups, irrespective of their previous experience, had still to do twelve months' internship in a hospital before they could obtain full registration. His Bill would put these groups on the same footing as doctors with Irish or recognised foreign qualifications who could obtain full registration if they offered evidence of appropriate hospital experience.

Mr. Hynd's Bill would also simplify the administrative procedure for admitting doctors to the provisional register. At present they had to produce a certificate of selection for employment and their qualifications had to be checked by the hospital and counterchecked by the board. This often meant considerable delay, and as a result doctors might be practising for days or weeks in hospitals quite illegally before they had been formally admitted to the Provisional Register. He suggested that we should return to the earlier procedure which left authority in the hands of the G.M.C.

Mr. Hynd assured the House that these changes had been discussed with the G.M.C., the British Medical Association, and other bodies who had all agreed that they were not only necessary but desirable.

Princess Louise (Kensington) Hospital for Children

In the House of Lords on June 16, Lord STRATHCLYDE, replying for the Government to a question about the future of this hospital,[1] said that the Minister of Health had decided to approve the temporary use of two wards for maternity patients during adaptation of the maternity unit at St. Mary's Hospital. He could not approve the long-term use of the hospital for adults, but would review its future again towards the end of the period of temporary use, which would be about two years after adaptation had been completed.

QUESTION TIME

A New Regional Hospital Board

Mr. JOHN EDEN asked the Minister of Health if he had yet come to a decision as to the date on which it would be possible to set up a separate Wessex Regional Hospital Board for the

1. See *Lancet*, 1957, ii, 41.

South West Metropolitan Region.—Mr. DEREK WALKER-SMITH replied: I have decided that it will be possible to do so on April 1 next and I am taking the necessary steps to bring the new region and regional hospital board into being on that date.

Morphine and Heroin Addiction Committee, 1926 (Review)

The Minister of Health, in consultation with the Secretary of State for the Home Department and the Secretary of State for Scotland, has appointed a committee with the following terms of reference:

To review in the light of more recent developments the advice given by the Departmental Committee on Morphine and Heroin Addiction in 1926; to consider whether any revised advice should also cover other drugs liable to produce addiction or to be habit-forming; to consider whether there is a medical need to provide special, including institutional, treatment outside the resources already available, for persons addicted to drugs; and to make recommendations, including proposals for any administrative measures that seem expedient.

The membership of the committee is as follows:

Sir Russell Brain, F.R.C.P. (chairman); Laurence Abel, F.R.C.S.; D. M. Dunlop, F.R.C.P.; Donald W. Hudson, M.P.S.; A. D. Macdonald, M.D.; A. H. Macklin, M.D.; S. Noy Scott, M.R.C.S.; and M. A. Partridge, D.M.

Emergency Telephone Lines for Hospitals

Mr. HERBERT MORRISON asked the Minister whether he had considered the report on emergency telephone and other arrangements at Lewisham Hospital in connection with the Southern Region railway disaster at St. Johns; and what action was being taken.—Mr. WALKER-SMITH: In general the arrangements appear to have worked well, and I should like to take this opportunity of paying a tribute to all who took part in meeting a very difficult situation. Detailed points have been discussed by representatives of the services concerned, and steps have been taken in this region to arrange for ex-directory lines at major hospitals and for a review of their telephone communications. The report has been circulated to all regional hospital boards, and consideration is being given to certain matters by my officers with a view to further action if required.

Hospitals Staffing Working Party

Mr. KENNETH ROBINSON asked the Minister the terms of reference of the working party set up to consider the medical staffing structure of the hospitals.—Mr. WALKER-SMITH replied: To study, in the light of experience of the hospital service since 1948 and of all other relevant considerations, the principles on which the medical staffing structure in the hospital service should be organised. Mr. ROBINSON: What member of the Working Party is qualified to assess the special needs of the mental hospitals in relation to medical staffing; and whether, in view of the composition of the working party, it is the Minister's intention to exclude from their consideration the problem of mental hospital staffing.—Mr. WALKER-SMITH: As the terms of reference indicate, the working party is to study the principles on which the medical staffing structure should be organised and not the number of staff required by individual hospitals. The working party is well equipped to cover the hospital service generally and I see no reason to modify its terms of reference.

Private Beds in London Hospitals

Mr. HENRY HYND asked the Minister of Health how many private beds were now available in London hospitals, as compared with the number before the creation of the National Health Service.—Mr. WALKER-SMITH replied: At Dec. 31, 1957, 2255 beds were available under sections 4 and 5 of the National Health Service Act, 1946, in the Metropolitan Police District. I understand that there were 2288 beds classed as private beds in the same hospitals shortly before the inception of the National Health Service, but as there was then no accepted definition of the term " private ", the figures are not strictly comparable.

Poliomyelitis Vaccine

In answer to a question Mr. WALKER-SMITH said that by April 30 over 3 million persons in Great Britain had been vaccinated with two injections, just over $2^1/_2$ million were awaiting vaccination, and a further 500,000 were awaiting their second injection. On that date the local health authorities held 1 million doses of vaccine and they had since received over 5 million more. This was more than sufficient to complete the vaccination with two doses of all persons registered by April 30 if they were willing to accept the type of vaccine available. Further supplies of vaccine were being distributed from time to time to keep pace with new registrations. He could not at present make any statement in regard to extending the offer of vaccination to other priority groups or about the giving of third doses.

Obituary

JOHN CLARK MIDDLETON

M.A., M.B., B.Sc. Glasg., F.R.F.P.S.

Dr. J. C. Middleton, honorary consulting physician to Glasgow Royal Infirmary, who died on May 30, will long be remembered as one of the characters of the Glasgow medical school. His students respected his gift for clinical teaching and his colleagues his flair for diagnosis. As one of them has said, " he was terse, sometimes uncomplimentary, but always helpful ".

He was born in Glasgow in 1883, the son of a schoolmaster, and educated at Whitehill School and Glasgow University. He graduated M.B. with honours in 1907 and after holding house-appointments in Glasgow hospitals he spent several years in general practice and acted as assistant bacteriologist to the burgh of Partick. In 1910 he was awarded the McCunn research scholarship and joined the staff of the university department of materia medica, where he worked under Prof. Ralph Stockman. In this appointment he undertook a great deal of pharmacological research and was responsible for the smooth running of the experiments undertaken by student volunteers. During the 1914–18 war he served with the R.A.M.C. After he was demobilised he returned to clinical medicine and became assistant physician to the Glasgow Royal Infirmary and visiting physician to the Western Dispensary. He also held a university lectureship in pharmacology and later in clinical medicine. In 1926 he was appointed chief in charge of wards at the Royal Infirmary, and he held this post until he retired in 1948.

A. H. I., who was on Middleton's staff in the 'thirties, writes:

J. C. Middleton was burly and rubicund with very little hair, his manner was bluff with a rather mordant wit, and his language at times was distinctly salty. Indeed, he was more like a prosperous farmer or ship's captain than a successful consultant physician. He had a reputation for lightning diagnosis, usually made from the foot of the patient's bed. Naturally he was sometimes wrong, but the frequency with which he was right was no surprise to those of us who knew his powers of acute and shrewd observation and his phenomenally retentive memory. He loved controversy and even appreciated being flatly contradicted. A ward round with him was a stimulating experience. Afterwards he would adjourn with his staff and over coffee would light one of the pipes of which he carried at least four ready charged. Amid clouds of acrid smoke, strongly tinctured with thick black tobacco, he would converse or argue on any topic under the sun. His assistants and house-physicians held him in such high esteem that they founded the J.C.M. Club whose sole function was to entertain him to dinner once a year. Former residents used to assemble from far afield and he was always at his best on these occasions. He has been retired for many years, but his memory is still vividly alive in his old hospital, and his passing will sadden all those of us who worked with him and knew him.

GEORGE HERBERT GARLICK

M.R.C.S., D.M.R.E.

Dr. G. H. Garlick, director of the Anti-Tuberculosis Association Clinic, Singapore, died in Switzerland on June 6 while on his way to London to attend a conference.

He was born in 1886, the son of Dr. George Garlick, of Gordon Square, London. He was educated at Epsom College, and studied medicine at St. Mary's Hospital, qualifying in 1912. Two years later he went to Malaya, first as medical officer to a tin mine for two years and then as medical officer to the Johore Government. He was appointed principal medical officer in 1930. Before he retired in 1941 he was largely responsible for designing the great new hospital at Johore Bahru. He retired to a cylindrical house he had built in the outskirts of Singapore, but almost at once joined the R.A.M.C. as specialist in radiology. He became a prisoner-of-war of the Japanese. After the war he returned to live at the Round House, Garlick Avenue, and applied his knowledge of radiology to the campaign against tuberculosis. He was a prime mover in the Anti-Tuberculosis Association, and when the Singapore clinic was opened in 1952 he became the director. He married Myrtle H. W. I. Ventris, by whom he had two daughters and a son, who is in general practice at Lakenheath in Suffolk.

J. K. M. writes:

Dr. Garlick will be remembered especially for his complete absence of snobbery and race-prejudice and by the Johore Bahru Hospital. His house was decorated by Chinese objets d'art. There was a bathing-pool beside which were tropical flowers and a life-size statue of a woman balancing on her hands. Gracious and modest, he was a charming host and colleague.

Diary of the Week

JUNE 22 TO 28

Monday, 23rd

UNIVERSITY COLLEGE, Gower Street, W.C.1
5 P.M. Prof. J. D. Fortuyn: The Rhinencephalon with Special Reference to Fishes.

POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12
4 P.M. Dr. J. F. Goodwin: Pulmonary Hypertension.

Tuesday, 24th

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5.30 P.M. Dr. R. W. Riddell: Less Common Mycotic Infections of the Skin.

Wednesday, 25th

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
5 P.M. *Endocrinology.* Prof. C. H. Best (Toronto): The Future in the Field of Diabetes.

POSTGRADUATE MEDICAL SCHOOL
2 P.M. Dr. R. M. Fry: Reflections on Diagnostic Bacteriology.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. Desmond O'Neill: Emotional Aspects of Skin Diseases. (First of two lectures.)

INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Dr. R. W. Riddell: Antibacterial Agents in the Treatment of Tuberculosis.

Thursday, 26th

UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) Dr. G. T. Pack (New York): Problem of the Pigmented Mole and Malignant Melanoma.

POSTGRADUATE MEDICAL SCHOOL
4 P.M. Dr. James Sharp: Differential Diagnosis and Management of Spondylitis.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. I. A. Magnus: Nickel, Chromium, and Eosin Epidermal Sensitisation.

Friday, 27th

POSTGRADUATE MEDICAL SCHOOL
10 A.M. Mr. A. W. Kay: Pyloric Antrum and Peptic Ulceration.
2 P.M. Dr. Henry Harkins (Seattle): Surgery as Practised in Europe and the United States—a Comparison.

INSTITUTE OF NEUROLOGY, The National Hospital, Queen Square, W.C.1
5 P.M. Sir Macfarlane Burnet (Melbourne): Encephalitis in New Guinea.

SOCIETY FOR ENDOCRINOLOGY
5.30 P.M. (26, Portland Place, W.1.) Prof. O. Mühlbock (Amsterdam): Hormonal Genesis of Mammary Cancer.

UNIVERSITY OF OXFORD
5 P.M. (Department of Pharmacology.) Prof. A. D. Welch (Yale University): Studies of Azauracil Riboside and of Interference with the Metabolism of Pyrimidines.

Notes and News

NURSES' HOURS OF DUTY

THE Minister of Health has accepted (H.M.[58] 45) a recommendation by the Nurses and Midwives Whitley Council that the hours of duty of hospital nurses and midwives (excluding staff in supervisory posts) should be reduced from 96 to 88 per fortnight as soon as conditions permit, and he has asked hospital boards and committees "to put in hand forthwith a complete review of the existing nursing and midwifery services and staffing arrangements in their hospitals with the object of giving effect to the recommendation to the fullest extent which local circumstances make practicable". Any increase in expenditure will have to be met by hospital authorities within the total of their authorised budget and additional funds will not be made available. The Minister recognises that this may limit the extent to which boards and committees will find it possible to implement the recommendation, but he feels sure that "a good deal can be done by concerted administrative action to reduce the hours of duty of nurses and midwives below the level worked at present". The Minister hopes that boards and committees will give special attention to the work of student nurses, and try to eliminate or reduce split duties wherever possible, and to arrange that the staff as a whole plan their off-duty time well in advance.

WORLD HEALTH ASSEMBLY

AT the World Health Assembly, in Minneapolis, Minnesota,[1] the W.H.O. Committee on Programme and Budget approved the 1959 general programme of work, which reflects increased activities against malaria, venereal diseases, treponematoses, and endemo-epidemic diseases, and in public-health administration, nursing, maternal and child health, mental health, and nutrition. Several delegates spoke of the need to expand and improve health statistics. The committee unanimously approved a proposal sponsored by the U.S.A. requesting the Director-General to "organise and arrange for special study of the role of the Organisation in research, and ways in which W.H.O. might assist more adequately in stimulating and coordinating research and developing research personnel".

EXTRAMURAL MEALS

MOST of us look forward to our meals with zest; and to the patient in hospital they are often the main events of his rather dull day and a vital part of his treatment. The importance of serving him with appetising, hot, nutritious meals is clear to all hospital administrators; so, too often, is the difficulty. In some hospitals, especially our large mental hospitals,[2] the kitchens are saddled with antique equipment and lie at a chilling trolley ride from the outlying wards. The food is cooked in bulk and much of it is at least partially prepared the day before it is eaten. All these defects are often aggravated by shortage of staff. But boards, management committees, and hospital officers alike are alert to make the best use of their resources, and most patients would agree that hospital food is improving.

A possible innovation which is being considered by the Battersea and Putney Group H.M.C., at the suggestion of the South West Metropolitan R.H.B., is to entrust the catering to an outside industrial firm. A firm, Peter Merchant Ltd., which are responsible for the catering of some hospitals in Northern Ireland and of Army units at Didcot, have visited two of the hospitals of the group (St. John's Hospital, a long-stay hospital of 469 beds; and Putney Hospital, an acute hospital of 106 beds) and submitted reports on their catering and the terms on which the firm would be willing to take it over.

If the scheme is accepted the firm, acting through supervisory executives visiting regularly, would instruct the catering staff in their methods of kitchen control, menu planning, and cooking, and generally supervise the department. In this way

1. See *Lancet*, June 7, 1958, p. 1234; *ibid.* June 14, p. 1286.
2. Hawes, D. G. H. *Lancet*, 1955, i, 1214.

they would act as the hospital's catering officer. They would buy on the open market, using their national buying power and taking advantage of market fluctuations. They would, therefore, need to have control of the food stores and would install a control-clerk/storekeeper. This would be the only employee engaged by them to work wholetime at the hospital. The rest of the staff would remain the employees of the H.M.C. The firm would be paid an agreed annual fee for this work and would also be reimbursed for the cost of food consumed in the hospital.

Battersea and Putney H.M.C. are at present studying the survey submitted by the firm, and it is hoped to make a decision shortly whether to allow the firm to take over the catering for an experimental period of not less than 6 months. The objects of the experiment would be, first in importance, to test the firm's claim that, as specialists, they would be able to improve the standard of catering for the benefit of patients and staff alike, and, second, to save money if possible.

GERIATRIC REABLEMENT UNIT

ON May 28 Lady Wakehurst opened a new wing at the Belfast City Hospital which is to serve as an extension of the department for the care of the elderly sick.

Wakehurst House, as it is to be called, has evolved from ten years' experience of the reablement of the elderly sick, and it has been specially planned for this work. Two unusual points in the design are the exercise bays and the sections for long-stay invalids. On the ground-floor there are staff offices and outpatient services, including physiotherapy and occupational therapy. The first and second floors have male and female 41-bed ward units respectively. The ward units were planned in the belief that sooner or later all doctors and nurses must accept responsibility for some long-stay patients so as to spread the load and avoid the unhappy concentrations of chronic sick of the old days. Each unit is L-shaped; the short limb is a separate 16-bed annexe with its own services, including lavatories, bath, sluice, and enema rooms, for long-stay invalids who need continuous nursing care. The long limb of the L is a 25-bed reablement ward divided into four open 6-bed cubicles and one single-bed ward for critically ill or disturbed and restless patients. To one side is a wide bay giving space for parallel bars, walking chair, and other facilities for daily exercise. At the ward entrance is a pleasant day-space close to the kitchen at the base of the L, and there is a sun balcony wide enough to take several beds.

University of Oxford

On June 7 the following degrees were conferred:

D.M.—John Towers.
B.M.—P. F. B. Owen (in absentia).

University of Cambridge

On June 7 the following degrees were conferred:

M.D.—Angus McGregor, K. E. K. Rowson, F. D. Schofield, C. C. D. Shute.
M.B., B.Chir.—*T. H. Almond.
M.B.—R. B. Cole, *David Freeman, A. E. Holmes.
* By proxy.

Royal College of Physicians of London

On Tuesday, July 8, Sir Lindor Brown will give the Bertram Louis Abrahams lecture on the mode of action of sympathetic nerves. On Thursday, July 10, Prof. P. B. Medawar will give the F. E. Williams lecture on the biology of the ageing. Both lectures will be given at the college, Pall Mall East, S.W.1, at 5 P.M.

Royal College of Physicians of Ireland

At a meeting of the college on June 6, with Dr. F. J. O'Donnell, the president, in the chair, the following were admitted to the fellowship:

K. M. Hickey, R. J. Kernohan, Patrick Logan, J. P. A. Ryan, D. S. Wilson, Mathuranath Bhattacharyya (in absentia).

The following were admitted as licentiates and members:

M. P. Awon, Enda Casement, D. E. Donovan, V. T. Greene, Conn Lucey.

University of London

On May 21 the degree of M.D. was conferred on E. J. Ross.

Dr. William Blackwood has been appointed to the university chair of neuropathology at the Institute of Neurology.

Dr. Blackwood, who is 47 years of age, qualified from the University of Edinburgh in 1934. After filling house-appointments in Edinburgh at the Royal Infirmary and the Royal Hospital for Sick Children and at Inverness he became assistant pathologist at the Royal Infirmary and was awarded the Crighton research scholarship. In 1938 he took the F.R.C.S.E. and in 1957 the M.R.C.P.E. In 1939 he was appointed pathologist to the Scottish Mental Hospitals' Laboratory and neuropathologist to the Royal Infirmary and Municipal Hospitals, Edinburgh. In 1945 he was appointed senior lecturer in neuropathology in the University of Edinburgh. In 1947 he came to London to join the staff of the National Hospital, Queen Square, as assistant pathologist, later becoming pathologist. His published work includes papers on immersion foot and on diffuse cerebral sclerosis. He was one of the authors of *Atlas of Neuropathology* which was published in 1949 and of the late Dr. J. G. Greenfield's *Neuropathology* published earlier this year.

Dr. J. N. Cumings has been appointed to the university chair of chemical pathology at the Institute.

Dr. Cumings, who qualified from King's College Hospital in 1927, is 52 years of age. After holding house-appointments at King's, he became assistant pathologist there. In 1930 he took the M.R.C.P. and a year later the M.D. Lond. In 1933 he was appointed assistant pathologist, and in 1945 clinical pathologist to the National Hospital, Queen Square. He was elected F.R.C.P. in 1953. He has published papers on creatine metabolism, on hepatolenticular degeneration, and on cerebral lipids in various diseases.

Dr. N. F. Morris has been appointed to the university chair of obstetrics and gynæcology at Charing Cross Hospital Medical School.

Dr. N. F. Morris is 38 years of age and qualified from St. Mary's Hospital in 1943. After holding resident appointments at St. Mary's and the East Ham Memorial Hospital he joined the R.A.F., in which he served as a surgical specialist with the rank of squadron-leader. In 1948 he returned to a registrar appointment at St. Mary's and also at the East End Maternity Hospital, and in 1949 took the M.D. Lond. and the M.R.C.O.G. Later he became senior registrar in the department of obstetrics and gynæcology, Hammersmith Hospital, where he remained until 1953 when he was appointed first assistant in the obstetrical unit at University College Hospital. He took up his present post of reader in obstetrics and gynæcology at the Institute of Obstetrics and Gynæcology and consultant obstetrician and gynæcologist to Hammersmith Hospital in 1956. He has published papers on several obstetric subjects. His recent studies have concerned the use of radioactive isotopes in the assessment of the effective uterine blood-flow at rest in late pregnancy and during exercise, and also during labour.

Royal College of Obstetricians and Gynæcologists

On Friday, July 25, at 5 P.M., at the college, Prof. James Black, formerly of the University of Witwatersrand, will give the William Meredith Fletcher Shaw lecture. The title of his lecture is Reminiscences of Fifty Years' Medical Practice—forty-seven of them in South Africa. Tickets may be had from the secretary, 58, Queen Anne Street, London, W.1.

Royal Australasian College of Physicians

At a meeting of the general body of fellows of the college held in Sydney on June 4, the following were elected and admitted to fellowship:

Under article 44: Lionel Lockwood (Victoria); J. A. R. Miles (New Zealand); J. S. Robertson (South Australia). *Under article 42*: R. A. Bakewell, J. D. Bergin, R. C. S. Dick, W. G. Gray, G. P. Hallwright, J. A. Keeling, L. S. A. Lewis, R. W. Medlicott, C. P. Powles (New Zealand); R. B. Blacket, Clair Isbister, A. G. McManis, R. D. Puflett, D. S. Stuckey, Helen M. Taylor (New South Wales); Joseph Bornstein, H. N. B. Wettenhall (Victoria); J. V. Gordon, B. S. Hetzel (South Australia); G. B. V. Murphy, N. V. Youngman (Queensland).

On June 3 the following were admitted to membership:

R. J. Cantwell, T. P. Casey, R. J. M. Coates, C. O. Crawford, P. M. Dennis, F. E. Dreifuss, J. D. Frankish, Colleen A. Hall, E. E. Hannah, H. J. H. Hiddlestone, R. O. H. Irvine, Dr. Malcolm Watt (New Zealand); L. Bernstein, R. W. Boden, G. M. Bourke, B. S. Clifton, H. Kronenberg, L. Lazarus, M. A. Mishkel, J. G. Opie, W. K. A. Paver, June M. Raine, F. L. Ritchie, W. A. Seldon, N. A. Talley, W. H. Wolfenden (New South Wales); R. R. Andrew, P. F. Bladin, D. M. Danks, A. P. Dorevitch, J. A. Game, G. S. Hale, A. D. McCutcheon, F. I. R. Martin, S. Shub (Victoria); T. H. Beare, J. R. Lawrence, R. H. C. Rischbieth (South Australia); J. M. Sutherland (Queensland); B. C. Bignold (Western Australia). *Under article 37*: M. C. Fowler (South Australia), R. D. K. Reye (New South Wales).

Royal College of Surgeons of England

On June 11 a ceremony of presentation of diplomas was held, for the first time, at the college.

Prof. C. F. W. Illingworth (Glasgow) and Prof. F. de G. d'Allaines (Paris) were admitted to the honorary fellowship. Prof. R. W. Scarff, Air Vice-Marshal J. C. Neely, and Prof. F. C. Wilkinson, who had been elected fellows, were formally admitted.

The presentation of diplomas to those who had been successful in the examinations of the college during the past year followed. Parties from each of the medical schools were presented in turn to the president for receipt of the diplomas at his hands, and some 200 diplomates were presented in this way.

At a meeting of the Council on June 12, with Sir James Paterson Ross, the president, in the chair, the following were coopted to the council for the year 1958–59, representing various branches of practice:

Dr. John Hunt, general practice; Dr. Frankis Evans, anæsthetics; Mr. T. Keith Lyle, ophthalmology; Mr. A. C. H. Bell, gynæcology and obstetrics; Prof. D. W. Smithers, radiology; Mr. C. Gill-Carey, otolaryngology; Sir Wilfred Fish, dental surgery.

Mr. D. Ioan-Jones and Mr. T. G. I. James were re-elected members of the court of examiners for a further three years.

The Hallett prize was awarded to Miss M. V. Ramchandani of the University of Bombay.

Diplomas of fellowship were granted to the following:

G. B. Northcroft, Valerie M. Thompson, W. B. Ashby, R. S. Sneath, F. R. Coffin, A. E. Buckle, P. L. C. Diggory, Alan Gillespie, F. J. Moynihan, J. M. Powley, W. J. Pryn, D. M. Millar, K. R. Pool, R. Y. Calne, A. R. Bearn, Richard James, P. S. Boulter, George Hayes, John Mutch, I. K. Mikhail, A. K. Chowdhury, William Lees, K. A. McCluskey, K. A. Menon, Joan Fowler-Wright, Hilton Harrop-Griffiths, N. H. Harris, R. H. Lewis, A. H. Petty, Kenneth Bloor, H. G. Brown, T. I. El-Gailani, Joseph Magri, G. A. W. Milner, R. F. Rohan, D. S. Sardana, C. B. Walker, K. R. Alimchandani, D. S. Dharmage, J. L. Dowse, J. G. Gray, G. L. Grigg, A. C. Jain, K. N. Khanna, M. L. Rajakaruna, Veluppillai Rasanayakam, G. E. Rousseaux, E. J. Williams, J. A. Adams, S. D. Chatterjee, M. H. Cox, J. C. Currie, E. J. England, A. P. Fuller, B. E. Hagan, A. H. T. Hodgkinson, R. A. Howett, Isidore Kaplan, B. H. Kelham, H. M. Learoyd, C. V. Mann, J. A. Marston, V. G. Mavalankar, John Moran, D. C. Patel, G. C. Robin, I. B. Tait, L. J. Walker, J. H. Williams, Raphael Attard, Dudley Churchill-Davidson, J. A. Girling, P. B. Humphris, S. R. Mitra, S. K. Nair, B. T. O'Connor, K. C. Perry, W. D. Proudman, G. R. Raad, M. P. Robinson, J. F. Sander, Lucas Souvlis, H. H. Srinivasan, Prem Virmani, N. K. Yong, Lakshman Das, H. F. Jeejeebhoy, I. D. Johnston, M. Y. D. Koawavwala, M. G. Maguire, B. A. Maurice, D. O'Sullivan, C. G. Paull, J. G. Ross, S. B. Singh, J. R. Solomon, D. E. Cam, R. D. P. Craig, A. R. Desai, K. H. Langford, M. B. Menelaus, R. P. Silverton, R. G. Smith, J. L. Dawson.

Lady Tata Memorial Fund

For research on leukæmia and allied diseases in the year beginning October, the trustees have made the following awards:

Grants for Research Expenses.—Dr. M. Seligmann (France), Dr. M. Simonsen (Denmark), Prof. B. Thorell (Sweden), Dr. M. Bessis (France), Prof. G. Klein (Sweden), and Dr. Jan Ponten (Sweden).

Scholarships.—Dr. A. J. Therkelsen (Denmark), and Dr. Aiyappan Pillai (Switzerland).

N.H.S. Administrative and Clerical Staffs

The two sides of the Administrative and Clerical Staffs Whitley Council have agreed that as a preliminary to negotiations on the application of the Noel Hall report to senior designated grades, an independent fact-finding committee of three should be asked to report on current rates of remuneration of staffs employed on comparable work in other employment. Sir Noel Hall has accepted an invitation to serve as chairman of the committee.

Institute for Advancement of Medical Communication

This institute was recently formed in New York "to study and develop ways to increase the efficiency of information exchange among medical scientists, medical educators, and practising physicians". The work of the institute, which is a non-profit organisation, will be financed by grants from private foundations and from agencies, private and federal, which support medical research. The charter members of the board of directors are Dr. Chauncey D. Leake, professor of pharmacology, Ohio State University; Dr. Homer W. Smith, professor of physiology, New York University; and Dr. Irving S. Wright, professor of clinical medicine, Cornell University. Dr. Richard H. Orr, assistant editor of *Metabolism* and formerly medical director of Grune and Stratton, Inc., will serve as executive director. The temporary headquarters of the institute are at 37, East 67th Street, New York 21, N.Y.

Symposium on Clinical Endocrinology

This symposium, limited to 30 consultant physicians, will be held from July 7 to 11 at the Postgraduate Medical School of London, Ducane Road, W.12. Further particulars may be had from the dean.

Diamond Jubilee of the R.A.M.C.

On Wednesday, June 25, at 5 P.M., at B.M.A. House, London, W.C.1, Sir Gordon Gordon-Taylor will give an oration, entitled *In Arduis Fidelis*, to commemorate the diamond jubilee of the R.A.M.C.

Snow Centenary

On June 16, the centenary of the death of John Snow, wreaths were laid on his grave in Brompton Cemetery by the president and members of the council of the Association of Anæsthetists of Great Britain and Ireland, the dean of the Faculty of Anæsthetists of the Royal College of Surgeons of England, and the presidents of the Sections of Anæsthetics and Epidemiology of the Royal Society of Medicine.

The honorary degree of doctor in the faculty of science of the University of Bologna has been conferred on Sir Charles Dodds. The British Ambassador attended the ceremony and the new graduate afterwards gave an address in French.

The Oliver Bird Prize for 1957 has been awarded to Dr. Gregory Pincus of the Worcester Foundation for Experimental Biology, Massachusetts.

The Bárány jubilee medal of the University of Uppsala has been awarded to Dr. C. S. Hallpike.

The council of the Middlesex Hospital Medical School have given the Comfort Crookshank award for cancer research for 1957 to Prof. Charles Huggins of the University of Chicago. He will deliver a lecture at the school at 3.30 P.M. on Thursday, July 3, on cancer of the prostate.

A meeting of the Biochemical Society will be held in the department of biochemistry of the University of Sheffield, at 2 P.M. on Friday, July 18.

The North Western Tuberculosis Society has adopted a new constitution and altered its name to the North Western Thoracic Society.

The annual general meeting and dinner of the Cambridge Graduates' Medical Club will be held at Gonville and Caius College on Friday, July 4, at 7.45 P.M. The Master of Gonville and Caius and the Regius Professor of Physic are dining as guests of the club. Any members who have not received notice of the dinner should write to Dr. T. B. Anderson, 1, Huntingdon Road, Cambridge.

The British Standards Institution has issued a draft British standard for hospital sterilisers: horizontal cylindrical steam pressure type (CY [SGC] 5522). Comments should reach the Institution, British Standards House, 2, Park Street, London, W.1, by July 4.

Appointments

EASTON, A. L. T., M.B. Cantab., F.R.C.S., M.R.C.O.G.: consultant obstetric and gynæcological surgeon, London Hospital.

GRATTON, ANNIE R., M.B. Manc.: school M.O. and assistant M.O.H., Middlesbrough.

HIGGIE, C. B., M.R.C.S., D.P.H.: M.O.H., Ellesmere, Wem, and Whitchurch, and assistant county M.O., Salop.

MACGREGOR, G. A., M.D. Lond., M.R.C.P.: part-time consultant physician, Guildford group of hospitals.

MACLEOD, R. C., M.D. Glasg., D.P.H., D.T.M. & H.: Sidmouth, Ottery St. Mary, Axminster, Seaton, and Honiton.

VAUGHAN, G. F., M.B. Lond., M.R.C.P., D.P.M.: physician in child psychiatry, Guy's Hospital, London.

Colonial Appointments:

BINNS, T. P., M.R.C.S., D.P.H.: principal M.O. (urban health), Northern Nigeria.

BOULOUX, J. A. F., M.R.C.S., D.L.O.: specialist (E.N.T. diseases), Mauritius.

DIKKO, R. A. B., M.R.C.S.: principal M.O. (endemic diseases), Northern Nigeria.

LOU-HING, E. W., L.R.C.P.E.: superintendent M.O. (specialist), leprosarium, Chacachacare, Trinidad.

LYDON, DANIEL, M.B. N.U.I.: senior administrative M.O., Northern Nigeria.

SEXTON, J. P., M.B. Edin., D.P.H., D.T.M. & H.: principal M.O. (curative services), Northern Nigeria.

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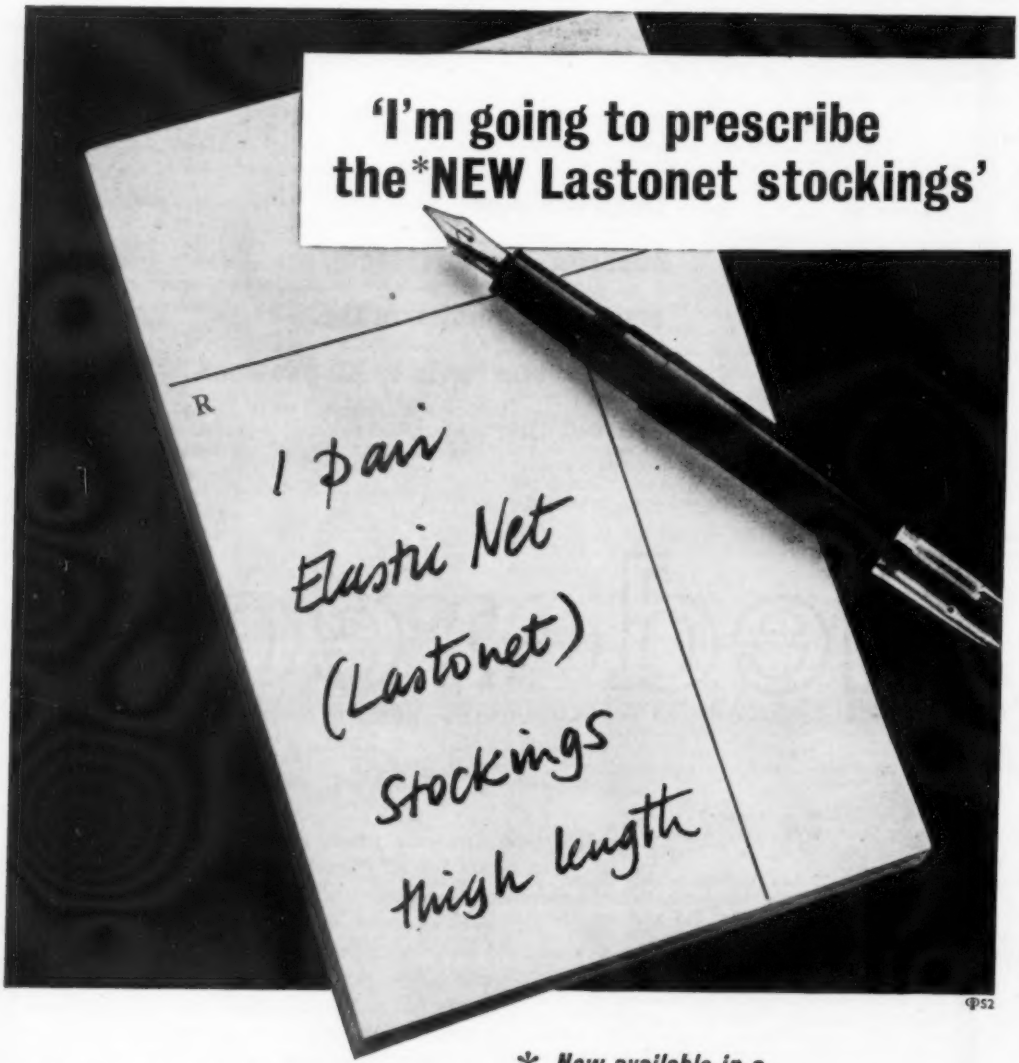

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[1] *Brit. med. J.* (1957) 2, 633

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Academic and Educational

UNIVERSITY OF LONDON

INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY

(Incorporating the teaching facilities of Queen Charlotte's Maternity Hospital, Chelsea Hospital for Women, and the Department of Obstetrics and Gynæcology at Hammersmith Hospital)

Applications are invited from graduates with a registrable qualification for enrolment for the AUTUMN TERM (1ST SEPTEMBER–29TH NOVEMBER, 1958). Graduates attend each of the constituent hospitals in turn for clinical work, and attend lectures and special demonstrations at all 3 hospitals. Enrolment fee £3. Tuition fee £36 a term.

General practitioners wishing further experience in obstetrics may be accepted to attend the course at Queen Charlotte's Maternity Hospital for shorter periods—i.e., 2–4 weeks. They will have the opportunity of attending the labour ward in addition to combined classes of lectures and demonstrations at the 3 hospitals of the Institute. Ministry of Health grants are payable to approved general practitioners attending for a period of 1 or 2 weeks.

An INTENSIVE COURSE for those preparing for M.D. and M.R.C.O.G. will be held from 1ST DECEMBER to 13TH DECEMBER, 1958.

During the winter vacation a limited number of graduates may attend the practice of the Hospital.

Hostel accommodation is available at Queen Charlotte's Hospital and at Hammersmith Hospital.

Further particulars can be obtained from the Secretary, Institute of Obstetrics and Gynæcology, Chelsea Hospital for Women, Dovehouse-street, London, S.W.3.

UNIVERSITY OF LONDON

A LECTURE entitled "The Problem of the Pigmented Mole and Malignant Melanoma" will be delivered by DR. G. PACK (New York) at 5.30 P.M. on 26TH JUNE at the London School of Hygiene and Tropical Medicine, Keppel-street, Gower-street, W.C.1.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

UNIVERSITY OF LONDON

POSTGRADUATE MEDICAL SCHOOL

SYMPOSIUM for Consultant Physicians on Clinical Endocrinology (excluding Thyroid) will be held on MONDAY, 7TH JULY, to FRIDAY, 11TH JULY, 1958, at the Postgraduate Medical School of London, Ducane-road, London, W.12.

The course is limited to 30 Consultant Physicians.

The fee for the 5-day course is £7 7s. (including all refreshments).

Applications should be made to The Dean, Postgraduate Medical School of London, Ducane-road, London, W.12.

THE WEST LONDON HOSPITAL MEDICAL SCHOOL

ROUSSEL RESEARCH FELLOWSHIP IN GENERAL MEDICINE

Applications are invited for the above Fellowship, tenable for 1 year in the first place, but renewable up to a maximum of 3 years. The successful applicant, who should be at least of the standing of Registrar, will be expected to work in the Department of Medicine under the supervision of one of the Physicians to the Hospital. The remuneration will be in the order of £1200 p.a.

Further details can be obtained from the undersigned.

MAURICE SHAW, Dean.

THE MILROY LECTURES ON STATE MEDICINE AND PUBLIC HEALTH

The Council of the Royal College of Physicians of London are prepared to receive applications for the office of MILROY LECTURER for 1960.

Applications must be addressed to the Registrar, Royal College of Physicians, Pall Mall East, S.W.1, to reach the College on or before Wednesday, 10th September, 1958, and to include a short synopsis of the subject selected by the candidate.

2 lectures are to be given on a Tuesday and Thursday in February or March, 1960.

A copy of Dr. Milroy's "Suggestions" on the subject of his bequest, and information as to the emolument, may be obtained from the Registrar.

JENNER MEMORIAL LECTURE

The Jenner Memorial Lecture of 1958 entitled "Modern Medicine and the Navajo" will be given by Professor WALSH MCDERMOTT (Cornell University) on TUESDAY, 1ST JULY, at 5.30 P.M., in the Board Room, St. George's Hospital, S.W.1.

Admission free without ticket.

THE UNIVERSITY OF LEEDS

DIPLOMA IN PSYCHOLOGICAL MEDICINE

A COURSE for the Diploma in Psychological Medicine will commence in OCTOBER, 1958, if sufficient entries are received. Instruction will be part-time and will occupy approximately 1½ days a week during 9 academic terms (3 years).

Further particulars may be obtained from the Secretary, School of Medicine, Thoresby-place, Leeds, 2, to whom application for admission to the course should be sent as soon as possible.

UNIVERSITY OF EDINBURGH

CHAIR OF BIOCHEMISTRY

The University Court invites applications for appointment to the Chair of Biochemistry, which will become vacant on 30TH SEPTEMBER, 1959.

The terms and conditions of appointment may be obtained from the undersigned, with whom applications (12 copies), giving the names of 3 referees and including any testimonials or evidence candidates may wish to offer, should be lodged not later than 1st September, 1958. A candidate from overseas may submit 1 copy of his application.

CHARLES H. STEWART, Secretary to the University.

May, 1958.

THE ROYAL SOCIETY

GOVERNMENT GRANT FOR SCIENTIFIC INVESTIGATIONS

Applications for grants from the second allotment of the Government Grant for Scientific Investigations for the year 1958 should be made as soon as possible on forms of application to be obtained from the Assistant Secretary of the Royal Society, Burlington House, London, W.1. No application can be considered which is received later than 31st July, 1958.

Applicants must of British nationality, resident in Great Britain or Northern Ireland. Grants may be made for purposes in connection with the promotion and support of research in pure science other than for personal maintenance or payment of stipends; for the assistance of scientific expeditions and collections; but not in aid of scientific publications.

THE UNIVERSITY OF SHEFFIELD
in association with
THE NOTTINGHAM HOSPITALS

A REFRESHER COURSE for general practitioners will be held in Nottingham during the week beginning MONDAY, 14TH JULY. The fee is 5 guineas, and accommodation in a University Hall of Residence can be arranged at a moderate additional charge. National Health Service practitioners are (subject to certain conditions) eligible to have the course fee paid on their behalf and to receive also certain allowances (travelling expenses, subsistence, locum fees).

As the number who can be accepted is limited, inquiries and applications (stating whether or not the latter are made under the scheme for National Health Service practitioners, and whether residential accommodation is desired) should be addressed as soon as possible to the Dean of the Faculty of Medicine, The University, Sheffield, 10.

THE UNIVERSITY
and the
ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

POSTGRADUATE MEDICAL EDUCATION COMMITTEE

REFRESHER COURSE FOR GENERAL PRACTITIONERS

A Refresher Course of 1 week's duration, designed for general practitioners, will be held at the Victoria Infirmary, Langside, Glasgow, S.2, from 22ND to 27TH SEPTEMBER, 1958. The course will consist, so far as possible, of bedside discussions and clinical conferences. Sessions will deal with general medicine, including cardiology and hæmatology, general surgery, orthopædics, gynæcology, ophthalmology, dermatology, and urology.

Lunch will be available at the Hospital.

The Course will rank for Government grant to eligible National Health Service practitioners. The fee for practitioners not claiming Government grant is £5 5s.

Since the number of places is limited, those wishing to attend should make early application to the Director of Postgraduate Medical Education, The University, Glasgow, W.2, from whom further information may be obtained.

ST. MARY'S HOSPITAL MEDICAL SCHOOL. Applications are invited for the appointment of a Full-time SECOND ASSISTANT DIRECTOR (Hon. Consultant grading) of the Pædiatric Unit for a period of 3 years with possibility of renewal. Salary within scale £1800–£100–£2500, together with superannuation under F.S.S.U. (or N.H.S.) and children's allowance. Candidates must have extensive pædiatric experience and be members of a Royal College of Physicians. Duties comprise teaching, research and responsible clinical work. Laboratory facilities and technical assistance are available for research.

Applications (3 copies), together with the names of 3 referees, should be sent before 9th July, 1958, to the Secretary, St. Mary's Hospital Medical School, Paddington, W.2, from whom further particulars should first be obtained.

UNIVERSITY COLLEGE LONDON, Gower-street, W.C.1, DEPARTMENT OF ANATOMY (Professor J. Z. Young), requires graduate RESEARCH ASSISTANT for work mainly connected with electron microscopy. There will be opportunity for original research. Candidates with good knowledge of biology and physical sciences preferred. Salary £700 p.a., plus £60 London allowance.

Applications, to be received by 12th July, 1958, should be sent to the Secretary of the College, from whom further particulars may be obtained.

UNIVERSITY OF LONDON. The Senate invite applications for the CHAIR OF PHYSIOLOGY, tenable at St. Bartholomew's Hospital Medical College (salary in the range £2300–£3000, plus £100 London allowance).

Applications (10 copies) must be received not later than 15th July, 1958, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars may be obtained.

THE UNIVERSITY OF MANCHESTER. Applications are invited for a full-time post as SENIOR LECTURER IN CHEMICAL PATHOLOGY. Candidates must be medically qualified and should have special qualifications in chemical pathology. Salary on a scale rising to £2400 p.a. Initial salary according to qualifications and experience. Membership of the F.S.S.U. and children's allowance scheme.

Applications should be sent not later than 5th July, 1958, to the Registrar, the University, Manchester, 13, from whom further particulars and forms of application may be obtained.

UNIVERSITY OF EDINBURGH. Department of Child LIFE AND HEALTH. Applications are invited from science graduates in biochemistry for the post of ASSISTANTSHIP IN BIOCHEMISTRY. Salary scale £700–£50–£850 p.a., with superannuation benefit and family allowance where applicable. The successful candidate will be expected to take up duty on 1st October, 1958.

Further particulars may be obtained from the undersigned, with whom applications, giving the names of 2 referees, should be lodged not later than 12th July, 1958.

CHARLES H. STEWART, Secretary to the University.

June, 1958.

UNIVERSITY OF LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for appointment as SENIOR REGISTRAR AND TUTOR IN PSYCHIATRY. The successful candidate will be a member of the University Department of Psychiatry and the duties will include work at the General Infirmary at Leeds with which the University Department is associated and such other duties as may be assigned to him by the Head of the University Department.

Applications (three copies), stating date of birth, qualifications and details of present and previous appointments with dates, and experience of teaching, together with the names of 3 referees, should reach the Registrar, The University, Leeds, 2 (from whom further particulars may be obtained), not later than 1st July, 1958.

THE WELSH NATIONAL SCHOOL OF MEDICINE (UNIVERSITY OF WALES). Applications are invited for the full-time appointment of LECTURER in the Department of Pharmacology. Medical qualification desirable but not essential. Salary within the scale £900–£100–£1650 p.a. (the maximum is under review). Point of entry according to qualifications and experience. Superannuation and child allowance schemes apply to this appointment.

Further particulars may be obtained from the undersigned, by whom applications should be received within 3 weeks of the appearance of this advertisement.

34, Newport-road, Cardiff. F. DODSWORTH, Secretary.

Hospital Services: Senior Appointments

ELIZABETH GARRETT ANDERSON HOSPITAL, N.W.1 (THE ROYAL FREE HOSPITAL GROUP). Applications are invited from registered Women medical practitioners for the appointment of Part-time CONSULTANT RADIOLOGIST in the X-Ray Diagnostic Department for 3 sessions per week. The appointment will commence on 1st October, 1958. Applicants should hold the D.M.R.D.

Applications, giving details of qualifications and experience, together with the names of 3 referees, should be sent to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, not later than 30th July, 1958.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. The Board of Governors invites applications for the appointment of PHYSICIAN (Consultant status) at The National Hospital, Queen-square, London, W.C.1. Candidates should be Members or Fellows of the Royal College of Physicians. The appointment will be part-time and the successful applicant will be required to attend 5 half-days per week.

Applications (40 copies), giving the names of 3 referees, must be submitted to the undersigned not later than 30th June, 1958.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospitals for Nervous Diseases,
Queen-square, London, W.C.1.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) CONSULTANT ANÆSTHETIST, 6 half-days a week, St. Charles' Hospital, Ladbroke-grove, W.10 (575 Beds).

Applications before 21st July, 1958.

(2) CONSULTANT ANÆSTHETIST, 7 half-days a week, to be divided between:—

King Edward Memorial Hospital, Ealing, W.13 (including Clayponds Wing, W.5). (Total beds 285.)

Perivale Maternity Hospital, Western-avenue, Greenford (51 Beds).

Brentford Hospital, Boston Manor-road, Brentford (33 Beds).

Acton Hospital, Gunnersbury-lane, W.3 (84 Beds).

Southall-Norwood Hospital, Southall (28 Beds).

Applications before 28th July, 1958.

Hospitals may be visited by direct appointment.

(3) 2 CONSULTANT PSYCHIATRISTS, each 4–7 half-days a week, Halliwick Hospital, New Southgate, N.11. The Hospital, which will be ready to admit patients in December, 1958, is a new unit of 134 Beds for selected and early cases of mental illness, and the posts offer opportunities for research into modern methods of treatment. Outpatient treatment will also be developed. Appointments to start approximately early November. Successful candidates will also have some duties in Friern Hospital, New Southgate. Hospital may be visited by direct appointment with the Physician-Superintendent of Friern Hospital.

Applications before 23rd July, 1958.

Application forms obtainable from and returnable to Secretary, North West Metropolitan Regional Hospital Board, 11a, Portland-place, W.1.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications invited for TRAINEE in Medical Administration at Board's headquarters. Initial salary in Medical Officer's grade commences at £1535 for officers aged 33 or over. Superannuable. Period of training not exceeding 1 year.

Full particulars can be obtained from DR. JAMES FAIRLEY, Senior Administrative Medical Officer, to whom applications should be addressed at 11, Portland-place, W.1, by 7th July.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT PSYCHIATRIST AND DEPUTY MEDICAL SUPERINTENDENT. Duties at Lea Colony, Bromsgrove (292 Beds), and Lea Castle Colony, Kidderminster (160 Beds), mental deficiency hospitals. D.P.M. and wide experience mental deficiency essential. Accommodation available at Lea Colony.

Applications (15 copies), stating age, nationality, qualifications, present and previous appointments and details of 3 referees, to Secretary, 10, Augustus-road, Birmingham, 15, by 21st July, 1958.

HIGH WYCOMBE, BUCKINGHAMSHIRE. WAR MEMORIAL HOSPITAL. SENIOR CASUALTY OFFICER required, Locum appointment 30th June–27th July inclusive. Senior Hospital Medical Officer grade.

Apply immediately to Secretary.

EPPING GROUP HOSPITAL MANAGEMENT COMMITTEE. OPHTHALMOLOGIST required for children's refraction clinics at Ongar, Essex (1 session monthly), at Epping, Essex (2 sessions monthly), and at Waltham Abbey, Essex (1 session monthly). Senior Hospital Medical Officer grade.

Further information can be obtained from the Group Secretary, Epping Group Hospital Management Committee, Oak Cottage, The Plain, Epping, Essex, to whom application should be made as soon as possible.

LEEDS REGIONAL HOSPITAL BOARD.

CONSULTANT in Obstetrics and Gynæcology (maximum part-time)—Huddersfield (6 sessions) and Halifax (3 sessions). Person appointed to reside in the Huddersfield Halifax area. Initial duties in Huddersfield will be mainly obstetric pending the provision of additional gynæcological beds in a new general hospital at present being built.

CONSULTANT in Anæsthetics—Ilkley, Otley and Menston (8 notional half-days per week). Duties mainly at Otley General Hospital (14 hours per week) with additional duties at Scalebor Park and Menston Mental Hospitals. Person appointed to reside in the Otley area.

Whole-time ASSISTANT PATHOLOGIST (Senior Hospital Medical Officer grade)—Goole, Pontefract and Wakefield. Person appointed to reside in the Goole Pontefract area.

Applications (12 copies), stating age, qualifications and details of present and previous appointments with dates, and names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 29th July, 1958.

MANCHESTER REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT ANÆSTHETIST (Senior Hospital Medical Officer), North Manchester Hospital Centre (Crumpsall, Ancoats, Manchester Northern and Victoria Memorial Jewish Hospitals) and Booth Hall (Children's) Hospital, Manchester. The post may also include some duties at Prestwich and Springfield (Mental) Hospitals. Good all-round experience in anæsthesia and higher qualifications essential; special experience of neurosurgical techniques additional asset; appointee to work under general guidance of consultants and live in or near Manchester.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by 8th July, 1958.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum CONSULTANT PHYSICIAN in Geriatrics (9 notional half-days per week) for North and South Tees-side Groups of hospitals. Accommodation available.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum SENIOR CASUALTY OFFICER (whole-time) for North Tees-side Group of hospitals—Stockton and Thornaby Hospital (130 Beds).

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. Assistant PHYSICIAN (Senior Hospital Medical Officer status—whole-time or maximum part-time) for Geriatric Unit, Sunderland Group of hospitals. Total geriatric beds 497, primarily at Sunderland General (217); Ryhope General (96); Leeholme (152); Boldon Hospital (32). Higher qualification desirable.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NORTH GLOUCESTERSHIRE CLINICAL AREA. SOUTH WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of CONSULTANT DENTAL SURGEON in the North Gloucestershire Clinical Area. The appointment will be on a part-time basis (4 sessions). The successful candidate will have charge of beds at the Gloucestershire Royal Hospital (Southgate-street), Gloucester, and at St. Paul's Hospital, Cheltenham; he will also be required to visit other hospitals in the clinical area as determined by the Regional Hospital Board.

Applications (12 copies) stating date of birth, qualifications and experience, together with the names and addresses of 2 referees, should be sent to the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 12th July, 1958.

OXFORD REGIONAL HOSPITAL BOARD. Consultant PATHOLOGIST (whole-time) to the Reading Area Pathology Service. Applicants should have special interest and experience in hæmatology, and the successful candidate will work as a member of the area team.

Applications, stating age, qualifications, experience and the names of 3 referees, should reach the Secretary (from whom further particulars may be obtained), 43, Banbury-road, Oxford, by 14th July.

RETFORD, NOTTINGHAMSHIRE. RAMPTON HOSPITAL. (1143 Beds for mental defectives of both sexes exhibiting conduct disorders.) Whole-time MEDICAL SUPERINTENDENT (Consultant). Wide experience in psychiatry, and the D.P.M., necessary. Post is clinical but experience in hospital administration also necessary. Candidates may visit Hospital by appointment with present Medical Superintendent.

Applications, naming 3 referees, and quoting ref. RMS 2, to the Secretary, Board of Control, Division 1(3), Ministry of Health Building, Savile-row, London, W.1, by 4th July, 1958.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Radiodiagnosis. Angus area. Applications are invited for the whole-time post of RADIOLOGIST (Consultant) at Stracathro Hospital, Brechin (648 Beds), Brechin Infirmary (96 Beds), Arbroath Infirmary (105 Beds), and other hospitals in the Angus area. Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, 430, Blackness-road, Dundee, with whom applications must be lodged not later than 14th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited from Women practitioners for the appointment of MEDICAL PÆDIATRICIAN (Consultant), 3 sessions per week, at the Bruntsfield and Elsie Inglis Hospitals, Edinburgh.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, within 30 days.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of ASSISTANT ANÆSTHETIST at Stobhill Hospital and the Royal Hospital for Sick Children, Glasgow, and at certain other hospitals in the region. The appointment will be whole-time or on the maximum part-time basis of 9 notional half-days per week. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ASSISTANT PSYCHIATRIST required at Kingsway Hospital, Derby. A house is available. Salary scale £1653 15s.–£52 10s.–£2126 5s. p.a.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 12th July, 1958.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time or maximum Part-time CONSULTANT RADIOLOGIST required. Duties mainly in hospitals in the Mansfield area.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 19th July, 1958.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires a Locum CONSULTANT in General Medicine for 9 sessions weekly in the Winchester Group of hospitals for approximately 4 months. The main duties will be at the Royal Hampshire County Hospital, Winchester (327 Beds), and the successful candidate will be required to visit other hospitals in the Group. Salary will be in accordance with the terms and conditions of service of hospital medical and dental staff.

Applications (2 copies), stating age, qualifications and experience, with names and addresses of 2 referees, to the Area Secretary, Highcroft, Romsey-road, Winchester, by 1st July, 1958.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT PSYCHIATRIST (2 half-days per week) for Littlegreen School for Maladjusted Boys, Compton, near Chichester. Littlegreen is a boarding school for 40 maladjusted boys, recently established by the West Sussex County Council. The successful candidate will be required to advise on the selection of boys for admission and will be responsible for their psychiatric supervision and treatment.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to the Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 19th July, 1958. Applicants may visit School by arrangement with the County Medical Officer of the West Sussex County Council, County Hall, Chichester.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT PSYCHIATRIST (2 half-days per week) for Park House (Home Office Approved) School, Peper Harow, near Godalming, Surrey. Applicants should preferably have had experience of investigating problems presented by the older age range of children attending Child Guidance or similar Clinics, and of undertaking, planning and guiding the appropriate and necessary form of treatment in individual cases.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to the Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 19th July, 1958. Applicants may visit School by arrangement with the Headmaster.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Whole-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer grade) for Warlingham Park Hospital, Surrey, which conducts a complete community mental health service for Croydon, including Child Guidance Clinic and special unit for alcoholism. All modern methods of treatment used and social and group therapy emphasised. Candidates should possess D.P.M. and preferably a higher qualification, and have wide experience in psychiatry.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 19th July, 1958. Applicants may visit Hospital by local arrangement.

ST. ALBANS CITY HOSPITAL AND WELWYN GARDEN CITY MATERNITY HOSPITAL. Locum Tenens CONSULTANT GYNÆCOLOGIST AND OBSTETRICIAN required for approximately 5 sessions per week during the period 7th July–28th September, 1958, at the above Hospitals.

Applications, stating qualifications and experience, together with the names of 2 referees, as soon as possible, to the Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans, Herts.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT TRAUMATIC AND ORTHOPÆDIC SURGEON required, Caernarvon and Anglesey Hospital Management Committee area, 26th July–16th August, 1958.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT ANÆSTHETIST required, West Wales Hospital Management Committee area, July–October, 1958.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

AUSTRALIA. PRINCE HENRY'S HOSPITAL, Melbourne, Australia. Applications are invited from legally qualified medical practitioners for the appointment of HONORARY SURGEON to Outpatients.

Applications to be lodged with the undersigned not later than Friday, 18th July, 1958.

R. L. THOMAS, Manager and Secretary.

NEW ZEALAND. THE OTAGO HOSPITAL BOARD, DUNEDIN, NEW ZEALAND. Applications are invited for the position of DIAGNOSTIC RADIOLOGIST, Otago Hospital Board. Applicants must hold a degree in Medicine of an approved University and possess a higher qualification in the specialty. The salary payable will be that of Junior or Senior Specialist under the Hospital Employment (Medical Officers) Regulations, viz: £1640–£2340 p.a. The commencing rate will be determined in accordance with the qualifications and experience of the appointee. The position is a full-time and non-resident one. Travelling expenses as set out in the Conditions of Appointment will be paid when a contract of service has been signed. Conditions of Appointment and application forms may be obtained from the Office of the High Commissioner for New Zealand, 415, The Strand, London.

Applications, stating age, qualifications and experience, together with health and radiological certificates, will be received by the undersigned until 10 o'clock A.M. on Monday, 25th August, 1958.

W. A. WILLIAMSON, Secretary,
Otago Hospital Board.

P.O. Box 946, Dunedin, New Zealand.

Hospital Services: Junior Appointments

ALBERT DOCK ORTHOPÆDIC AND FRACTURE HOSPITAL, Alnwick-road, E.16. SEAMEN'S HOSPITALS GROUP. SENIOR HOUSE OFFICER for Receiving Room duties required on 20th July. Post, which is normally resident, is recognised by the Royal College of Surgeons, and provides excellent experience in a wide variety of traumatic conditions received from the adjacent dockland and from shipping in the Port of London. Salary £819 10s.

Applications, stating age, nationality, qualifications and experience, with the names of 2 recent referees, should be sent to the Secretary, Dreadnought Seamen's Hospital, Greenwich, S.E.10, not later than 12th July.

BROMPTON HOSPITAL, S.W.3. Applications invited for post of Part-time CLINICAL ASSISTANT in E.N.T. Department. Duties amounting to 2 sessions weekly include work in Outpatient Clinic as well as operating sessions. Salary at the rate of £183 15s. p.a. per notional half-day.

Applications, stating age, qualifications with dates, nationality and appointments held, together with copies of testimonials, by 5th July, 1958, to KENNETH A. F. MILES, House Governor.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD, London, W.1. REGISTRAR (whole-time) required in General Medical and Neurological Department, Central Middlesex Hospital, Park Royal, N.W.10. Duties include undergraduate teaching. Resident when on duty. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to Group Secretary, Central Middlesex Group Hospital Management Committee, by 1st July, 1958.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. SENIOR HOUSE OFFICER required in general medicine, with duties mainly in the Geriatric Department. Good facilities for higher examination and insight into working of general practice. Whole-time appointment for 6 months in first instance. Post vacant 1st August.

Applications, with 2 testimonials, to Medical Director by 28th June.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER (post-registration) required in Gastroenterological Department. Appointment from 1st August.

Applications, with 2 testimonials, to Medical Director by 28th June.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in Pædiatric Department. Post-registration appointment recognised for D.C.H. Appointment from 1st August.

Applications, with 2 testimonials, to Medical Director by 28th June.

CHARING CROSS HOSPITAL, W.C.2. Locum Full-time NON-RESIDENT PÆDIATRIC REGISTRAR (grade Registrar or Senior Registrar, to be decided). Tenable from 8th September, 1958, for 1 year. Candidates should have had experience in paediatrics, and preference will be given to those holding the M.R.C.P. The Registrar's duties will include work in the Pædiatric Departments of Charing Cross, Harrow, Kingsbury, Wembley, and Mount Vernon Hospitals.

Application forms, obtainable from the undersigned, should be returned by 31st July, 1958.

FRANK HART, Secretary to the Board.

Charing Cross Hospital, W.C.2.

CHARING CROSS HOSPITAL, W.C.2. Senior House OFFICER in Pathology for 1 year in the first instance from 20th August, 1958, with eligibility for promotion to Registrar grade for a further year. During this 2-year period, approximately 1 year will be spent in residence in the Hospital.

Application forms obtainable from the undersigned to be returned by 4th July, 1958.

FRANK HART, Secretary to the Board.

CITY OF LONDON MATERNITY HOSPITAL, Hanley-road, London, N.4. RESIDENT SENIOR HOUSE OFFICER (obstetrics). Appointment vacant 24th July for period of 12 months. Applicants must have had previous obstetric experience. Recognised for M.R.C.O.G.

Application form obtainable from Hospital Secretary and returnable by 8th July.

CHILD GUIDANCE TRAINING CENTRE, 6, Osnaburgh-street, N.W.1. A vacancy will occur on 1st October, 1958, for a PSYCHIATRIC REGISTRAR in Training (part-time for 5 sessions per week with possibility of later conversion to full-time). Preference given to applicants intending to specialise in Child Guidance. Previous psychiatric experience essential. Clinic may be visited by direct appointment.

Application forms obtainable from and returnable to the Secretary to the Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 5th July, 1958.

CHINGFORD HOSPITAL, London, E.4. (104 Beds.) House OFFICER (medical) required for 6 months with duties at other hospitals in the Group.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

COLINDALE HOSPITAL, Colindale-avenue, London, N.W.9. (300 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time SURGICAL REGISTRAR, resident or non-resident, required at above Hospital. F.R.C.S. and previous experience an advantage. Work covers surgical treatment of pulmonary, orthopædic, urinary, and tuberculous and non-tuberculous chest diseases. The Hospital is situated within easy reach of central London and may be visited by arrangement with Physician-Superintendent.

Application forms obtainable from and returnable to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edgware, Middlesex, by 5th July, 1958.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (123 Beds.) Applications are invited for the post of SECOND CASUALTY OFFICER with duties in the Department of Orthopædic and Traumatic Surgery (Senior House Officer grade). Recognised for F.R.C.S. Salary £819 10s. p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from pre-registration and registered Women medical practitioners for the post of FIRST HOUSE SURGEON with charge of general surgical beds. Appointment for 6 months from 1st July, 1958. Salary according to Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, immediately.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from pre-registered and registered Women medical practitioners for the post of HOUSE SURGEON to the Gynæcological Department (recognised for M.R.C.O.G.). Duties to commence 1st August, 1958. Appointment for 6 months. Salary in accordance with Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 25th June, 1958.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1 (ROYAL FREE HOSPITAL GROUP). Locum FIRST HOUSE SURGEON required immediately. Post open to registered or pre-registration candidates.

Apply to The Secretary, Elizabeth Garrett Anderson Hospital, Euston-road, N.W.1 (EUSton 2501).

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications for the 6-month resident appointment, now vacant, of Pre-registration HOUSE PHYSICIAN should be sent to Group Secretary, Hackney Hospital, E.9, quoting GH/PHP.

GREENWICH AND DEPTFORD AND SEAMEN'S GROUPS. PATHOLOGICAL SENIOR HOUSE OFFICER vacancy in Group Laboratories. Post recognised for D.Path. of Conjoint Board.

Applications, stating age, qualifications and experience, with names of 2 referees to Group Secretary, Seamen's Hospital, Greenwich, S.E.10.

GUY'S HOSPITAL, S.E.1. Applications are invited for the post of REGISTRAR in the Department of Dermatology at Guy's Hospital, with appointment as soon as possible until 30th September, 1959.

Forms of application are obtainable from, and should be lodged with, the Superintendent, Guy's Hospital, London Bridge, S.E.1. not later than 27th June, 1958.

HACKNEY HOSPITAL, London, E.9. (General—857 Beds.) Applications for the 6-month resident appointment, now vacant, of Pre-registration HOUSE PHYSICIAN should reach the Secretary, above address, by 30th June, quoting HH/PHP.

HACKNEY HOSPITAL, London, E.9. (857 Beds.) Applications from registered practitioners for appointment to the 6 months' resident post of HOUSE SURGEON, with duties in E.N.T., Plastic Surgery, Orthopædic, and Casualty Departments, should reach Secretary, above address, by 4th July, quoting HH/CO.

HENDON ISOLATION HOSPITAL, Goldsmith-avenue, N.W.9. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR (resident or non-resident), full-time, required at above Hospital. General medical beds associated with the Medical Department of Edgware General Hospital, in addition to those for communicable diseases. The successful candidate will be associated with the Poliomyelitis Research Unit of the Institute of Orthopædics (University of London) which is established at the Hospital. Post vacant 6th October, 1958. Hospital may be visited by appointment with the Physician-in-Charge.

Application forms obtainable from and returnable to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edware, Middlesex by 28th June, 1958.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. HOUSE SURGEON required. Vacant 4th July. Duties mainly orthopædic with some E.N.T. and emergency general surgery. New operating-theatre, outpatient and casualty department. Post recognised for pre-registration service.

Applications, with copies of 3 testimonials and name and address of 1 referee, to Hospital Secretary.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON. Vacant 24th July, 1958. Recognised for the F.R.C.S. The successful candidate will be required to carry out a fortnight's locum duty from 10th July, 1958.

Application forms from the Hospital Secretary.

LONDON CHEST HOSPITAL. Hospitals for Diseases of THE CHEST. A vacancy occurs for REGISTRAR in Clinical Pathology (Registrar grade). The appointment (resident) is a whole-time one and will be for 1 year in the first instance.

Applications, stating date of birth, qualifications with dates, and previous experience, together with copies of 3 testimonials, should be forwarded at once to the undersigned.

J. ROBBINS, House Governor.

London Chest Hospital, E.2.

LONDON CHEST HOSPITAL. Hospitals for Diseases of THE CHEST. A vacancy occurs 1st August, 1958, for RESIDENT HOUSE PHYSICIAN. Appointment for 6 months, 4 in London, 2 at the Country Branch, near Letchworth, and post graded as House Officer. Duties include work in the Outpatient Department and special clinics, as well as in wards.

Applications, stating date of birth, qualifications with dates, and previous appointments held, with copies of 3 testimonials, should reach the undersigned not later than 1st July.

J. ROBBINS, House Governor.

London Chest Hospital, E.2.

MOTHERS' HOSPITAL (SALVATION ARMY), London, E.5. (Maternity, 110 Beds.) Applications for the 6-month resident appointment, vacant 1st September, of Pre-registration OBSTETRIC HOUSE SURGEON (recognised for M.R.C.O.G.) should be sent to the Group Secretary, Hackney Hospital, E.9, quoting MH/PHO.

MOTHERS' HOSPITAL (SALVATION ARMY), London, E.5. (Maternity, 110 Beds.) Applications invited from registered practitioners for the 6-month resident appointments of :—

(*a*) OBSTETRIC HOUSE SURGEON, vacant 1st August.
(*b*) OBSTETRIC HOUSE SURGEON, vacant 1st October.

Posts recognised for M.R.C.O.G.

Applications should be sent to the Group Secretary, Hackney Hospital, E.9, quoting MH/HO (*a*) or (*b*).

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of ASSISTANT REGISTRAR (non-resident) at The National Hospital, Queen-square, W.C.1, for duty in the Outpatient Department and the Department of Applied Electrophysiology, to commence 1st October, 1958. This post carries the grade of Senior Registrar. The appointment will be for 1 year in the first instance.

Applications, with names of 3 referees, to be sent to the undersigned not later than 12th July, 1958.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospitals for Nervous Diseases,
Queen-square, London, W.C.1.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. RESIDENT ANÆSTHETIST (Senior House Officer grade) with certain duties as House Physician in the Children's Ward and Casualty Department. Post recognised for D.A. Vacant now.

Applications, stating age, qualifications and experience, with copies of testimonials and the name of 1 referee, should be sent to the Group Secretary, St. Helier Hospital, Carshalton, Surrey.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. HOUSE SURGEON (resident, not pre-registration). Post vacant now. Recognised for F.R.C.S.

Applications, stating age, qualifications, &c., with the names and addresses of 2 referees, should be sent to the Secretary at above address.

NORTH EAST METROPOLITAN REGIONAL HOS-PITAL BOARD.

North Middlesex Hospital and Annexe

SURGICAL REGISTRAR, non-resident, sleeping-in on duty nights. Duties may include teaching. F.R.C.S. desirable. Vacant September.

Chase Farm Hospital, Enfield, Middlesex

SURGICAL REGISTRAR for 1 year only. Non-resident. Recognised for F.R.C.S. Genitourinary experience desirable.

King George Hospital, Ilford

SURGICAL REGISTRAR—including duties in Orthopædic and Casualty Department. Resident or non-resident.

Essex County Hospital, Colchester

CASUALTY AND ORTHOPÆDIC REGISTRAR. Resident or non-resident. Recognised for F.R.C.S. (casualty appointment).

Whipps Cross Hospital, E.11

ORTHOPÆDIC REGISTRAR. Non-resident.

South Ockendon Hospital, Essex

REGISTRAR in Mental Deficiency. Non-resident, 5-room staff house available—also garage. D.P.M. desirable.

Appointments subject to review after 1 year.

Application forms from Secretary, 11A, Portland-place, W.1, to be returned by 5th July.

NORTH MIDDLESEX HOSPITAL and EDMONTON CHEST CLINIC, London, N.18. Applications are invited for the post of SENIOR HOUSE OFFICER (tuberculosis), resident, for 1st August (Locum 22nd–31st July). Appointment for 6 months in the first instance with possible extension to 1 year. Duties at above Hospital and Clinic under the direction of the Chest Physician. Further details on request.

Applications, stating age, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital.

NORTH MIDDLESEX HOSPITAL, London, N.18. OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON, resident, registered or pre-registered (second post), required for 1st August. 6 months' appointment. Recognised by R.C.O.G. for Diploma, and as a combined post for Membership. Candidates must have held house appointment in either medicine or surgery. Large Obstetric and Gynæcological Department.

Applications (in own handwriting), stating age, nationality, qualifications, experience, with copies of recent testimonials, to Group Secretary, by 1st July.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited for the posts of 2 REGISTRARS (obstetrics and gynæcology). Whole-time. Recognised for M.R.C.O.G. Department contains 93 obstetric and 38 gynæcology beds. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to the Secretary to Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 5th July, 1958.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited to fill the post of SENIOR HOUSE OFFICER (casualty—resident on duty) (1 of 3). Recognised for F.R.C.S.

Applications, stating age, experience, qualifications, together with names and addresses of 2 referees, to be sent to Hospital Secretary immediately.

PRINCESS BEATRICE HOSPITAL, S.W.5. Applications are invited from registered medical practitioners for the post of HOUSE PHYSICIAN for 6 months (Senior House Officer grade); resident. Opportunity to serve a further 6 months as Obstetric/Gynæcological House Surgeon in the same grade. Post vacant early July.

Applications, with 3 testimonials, to House Governor by 1st July.

QUEEN CHARLOTTE'S AND CHELSEA HOSPITALS. QUEEN CHARLOTTE'S MATERNITY HOSPITAL. JUNIOR OBSTETRIC OFFICER (Senior House Officer) resident posts tenable for 6 months from 1st October, 1958.

Applications to the House Governor by 5th July on forms obtainable from 339, Goldhawk-road, London, W.6.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. HOUSE PHYSICIAN (third post) for 6 months commencing as soon as possible.

Applications, with the names of 2 referees, to Hospital Secretary by 28th June, 1958.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. Applications are invited for the post of Part-time CLINICAL ASSISTANT (G.P. grade) to the Physician-in-Charge Diabetic and Endocrinology Department. The appointment will be for 2 outpatient sessions per week (Tuesday late afternoon and Friday morning), to commence as soon as possible. Remuneration £183 15s. per session p.a.

Applications, together with the names of 2 referees, to the Group Secretary, West Ham Group Hospital Management Committee, Stratford, E.15, by 5th July, 1958.

ROYAL FREE HOSPITAL, Gray's Inn-road, W.C.1. Applications are invited from registered medical practitioners taking the D.M.R. course commencing in October, 1958. 1 trainee post is offered. Salary in accordance with the rate laid down for Senior House Officers.

Application forms may be obtained from the Secretary to the Board of Governors, to whom they should be returned not later than 1st July, 1958.

ROYAL MARSDEN HOSPITAL, Fulham-road, S.W.3. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Senior House Officer) to commence duty in August. The appointment is for a period of 12 months. Preference will be given to Fellows of the Royal College of Surgeons.

Application forms obtainable from the House Governor, to whom they should be returned together with copies of 3 recent testimonials, not later than 1st July, 1958.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Orthopædic Surgery to fill a vacancy in the approved trainee establishment at the Camberwell Group of hospitals. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience, with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 5th July, 1958.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Anæsthetics to fill a vacancy in the approved trainee establishment at the Camberwell Group of hospitals. The post is recognised for the D.A. and F.F.A. R.C.S. examinations. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, 11, Portland-place, W.1, not later than 5th July, 1958.

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. HOUSE PHYSICIAN (registered or pre-registration) required. Combined tuberculosis and acute medicine. Post vacant June 30th, 1958.

Form of application from the Secretary, to be returned immediately.

ST. MARY'S HOSPITAL FOR WOMEN AND CHILDREN, Upper-road, Plaistow, London, E.13. Locum HOUSE SURGEON required to commence on 30th June, 1958, for 2 weeks. Duties include general surgery, gynæcology, and E.N.T.

Apply to Hospital Secretary.

ST. MARY'S HOSPITAL, Paddington, W.2, and the NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in General Medicine from 1st October, 1958, for combined appointment. First 2 years at Paddington General Hospital, and the final 2 years at St. Mary's Hospital. Possession of higher medical qualification essential. Hospitals may be visited by direct appointment.

Application forms, which may be obtained from the House Governor, must be returned not later than 8th July, 1958.

ST. MARY'S HOSPITAL, W.2, and NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. (Combined appointment.) SENIOR REGISTRAR in Morbid Anatomy, the first 2 years of this appointment being in the new laboratories at Paddington General Hospital. The third and fourth years will be spent in the Department of Morbid Anatomy at St. Mary's Hospital.

Application forms, which may be obtained from the House Governor, St. Mary's Hospital, should be returned not later than 10th July, 1958.

ST. CHARLES' HOSPITAL, Ladbroke-grove, W.10. (576 Beds.) Applications are invited for the post of Whole-time RESIDENT REGISTRAR (surgical) for Major Thoracic Surgical Unit. Experience in general surgery and thoracic surgery essential and higher surgical qualification an advantage. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to the Secretary to the Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 5th July, 1958.

ST. LEONARD'S HOSPITAL, Nuttall-street, London, N.1. Applications are invited from registered or provisionally registered medical practitioners for the post of HOUSE SURGEON for 6 months.

Applications, with 2 recent testimonials, to the Hospital Secretary by 4th July, 1958.

ST. PETER'S, ST. PAUL'S AND ST. PHILIP'S HOSPITALS. RESIDENT SURGICAL OFFICER (Senior Registrar grade) required for St. Paul's Hospital on 1st September, 1958. Applications invited from Male candidates on the British register who have completed their training in general surgery. Appointment for 6 months, with opportunity for a further 6 months if recommended. Candidate should be prepared to spend 1 year at the Hospital if required.

Applications (12 copies), and the names of 3 referees, should reach the House Governor, St. Peter's Hospital, Henrietta-street, W.C.2, by 19th July, 1958.

ST. STEPHEN'S HOSPITAL, Fulham-road, Chelsea, S.W.10. Locum SURGICAL REGISTRARS required from 30th June to 20th July (inclusive), 7th to 18th July (inclusive), and 28th July to 3rd August (inclusive). Non-resident.

Telephone: FLAxman 8161, extension 1.

ST. THOMAS'S HOSPITAL, London, S.E.1. Obstetric HOUSE PHYSICIAN at the General Lying-in Hospital, York-road, S.E.1, for a period of 6 months from 3rd September, 1958. Resident. Approved service for M.R.C.O.G.

Applications from fully registered practitioners only, giving the names of 2 referees, to the Clerk of the Governors by 5th July, 1958.

TAVISTOCK CLINIC, 2, Beaumont-street, London, W.1. Applications are invited for the whole-time post, commencing 1st September, 1958, of PSYCHIATRIC REGISTRAR in the Department for Children and Parents. The Clinic may be visited by direct appointment.

Application forms obtainable from and returnable to Secretary to the Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 5th July, 1958.

UNIVERSITY COLLEGE HOSPITAL, Gower-street, W.C.1. Applications are invited for the post of SENIOR SURGICAL REGISTRAR, for 1 year in the first instance from a date to be arranged.

Applications, with the names of 2 referees, to T. F. W. MACKEOWN, Administrator and Secretary, by 4th July, 1958.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. Applications invited for post of RESIDENT CASUALTY OFFICER (Senior House Officer grade) with duties as House Physician in Skin Department for 1 year from 1st October, 1958. Board and lodging £150 p.a.

Applications (11 copies), with names of 2 referees, to House Governor by 5th July.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. Applications invited for post of SENIOR HOUSE OFFICER to E.N.T. Department for 1 year from 18th October, 1958.

Applications (5 copies), with names of 2 referees, to House Governor by 5th July.

WHITTINGTON HOSPITAL, London, N.19. Senior HOUSE OFFICER (casualty) vacant 21st August, 1958. Non-resident post.

Application forms obtainable from Group Secretary, 46, Cholmeley-park, London, N.6 (ARChway 3070, extension 527), and returnable to the Medical Superintendent, Whittington Hospital, London, N.19, by 1st July, 1958.

ABERYSTWYTH, CARDIGANSHIRE. GENERAL HOSPITAL. MID-WALES HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (surgical) required (resident). Post recognised for F.R.C.S. examination. Vacancy immediate.

Applications, stating age, experience, &c., to the Group Secretary, Mid-Wales Hospital Management Committee, 31, North-parade, Aberystwyth, Cardiganshire.

ALTON, HAMPSHIRE. HENRY GAUVAIN HOSPITAL. (112 Beds.) LORD MAYOR TRELOAR GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for the above Hospital for a period in the first instance of 6 months. Post vacant 1st August, 1958. Non-pulmonary tuberculosis, orthopædic and general surgery. Primary or Final F.R.C.S. candidate preferred, married or single, to live in small cottage on estate.

Applications, together with the names and addresses of 3 referees, to Hospital Secretary, Henry Gauvain Hospital, Alton, Hants.

ALTRINCHAM GENERAL HOSPITAL AND ANNEXE AND E.N.T. DEPARTMENT. (183 Beds.) Applications are invited for the following pre-registration posts vacant July, 1958:

JUNIOR HOUSE OFFICER (medical).

JUNIOR HOUSE OFFICER (surgical).

Applications to Group Secretary, North and Mid Cheshire Hospital Management Committee, The Hospital, Sinderland-road, Altrincham, Cheshire.

ALTRINCHAM GENERAL HOSPITAL AND ANNEXE AND E.N.T. DEPARTMENT. (183 Beds.) SENIOR HOUSE OFFICER (medical). This appointment in a busy Hospital offers excellent opportunities of practical experience. Post vacant mid-September.

Applications, together with 2 recent testimonials, to Group Secretary, North and Mid-Cheshire Hospital Management Committee, The Hospital, Sinderland-road, Altrincham, Cheshire.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE. 2 HOUSE PHYSICIANS required at Ashton-under-Lyne General Hospital. Vacant August, 1958. Preference given to pre-registration candidates.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required at Ashton-under-Lyne General Hospital. Preference will be given to pre-registration applicants. Recognised for F.R.C.S. (Eng.). Vacant 1st July, 1958.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne.

AYLESBURY, BUCKINGHAMSHIRE. ROYAL BUCKINGHAMSHIRE HOSPITAL. Accident and orthopædic and children's general surgery. SENIOR HOUSE OFFICER required 1st August. Recognised for F.R.C.S.

Apply, with 2 names for reference, to Secretary-Superintendent.

AYLESBURY, BUCKINGHAMSHIRE. ROYAL BUCKINGHAMSHIRE HOSPITAL. Accident and orthopædic and children's general surgery. HOUSE OFFICER required 1st August. Recognised for F.R.C.S. Pre-registration post, but registered practitioners are invited to apply.

Apply, with 2 names for reference, to Secretary-Superintendent.

BALLOCHMYLE HOSPITAL, Ayrshire. (320 Beds.) HOUSE OFFICER (gynæcology). Vacant 1st September. Resident post-registration appointment, recognised M.R.C.O.G. Offers wide experience under Consultant supervision. National terms.

Apply immediately Area Medical Superintendent, Ballochmyle Hospital (Telephone: Catrine 281).

BARNSTAPLE, NORTH DEVON INFIRMARY. (105 Beds.) HOUSE SURGEON (pre-registration) required from mid-July.

Applications, naming 2 referees, to Group Secretary, 19, Alexandra-road, Barnstaple, N. Devon.

BEBINGTON, WIRRAL, CHESHIRE. CLATTERBRIDGE HOSPITAL. CENTRAL WIRRAL GROUP. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (casualty/orthopædics) (resident or locum). Salary in accordance with current terms and conditions of service—i.e., £852 10s.–£55–£1182 10s. p.a., less £170 p.a. for residential facilities.

Application forms, obtainable from the Secretary, should be returned within 10 days of the appearance of this advertisement.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) HOUSE SURGEON (House Officer or Senior House Officer grade according to experience). Vacant now. General surgical duties, some orthopædics. Offers good opportunity for general experience in busy acute general hospital. Recognised for F.R.C.S. Approved pre-registration post but fully registered practitioners may apply.

Applications to Group Secretary, Westwood Hospital, Beverley, Yorkshire.

BEXLEY HOSPITAL, Dartford Heath, Bexley, Kent. BEXLEY HOSPITAL MANAGEMENT COMMITTEE. Applications invited for appointment of SENIOR HOUSE OFFICER at above Hospital. Salary £819 10s. p.a. with deduction of £150 p.a. for board, lodging, &c., if resident. The Hospital (2300 Beds) deals with all types of psychiatric illness, and experience in all modern physical, occupational psychotherapeutic procedure is available. Opportunities will be available to assist at outpatient clinics.

Applications, with names and addresses of 3 referees, should be sent to the Physician-Superintendent, Dr. L. C. COOK, M.D., D.P.M., within 14 days of the appearance of this advertisement.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, Birmingham, 15. ANÆSTHETIST (Senior House Officer), resident. Vacant 1st August, 1958. There are 3 Consultant Anæsthetists and training is given in modern methods of anæsthesia. Ample opportunity for study. Previous experience not essential.

Applications, with details naming 2 referees, to Administrator.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. (215 Beds and 8 House Surgeons.) HOUSE SURGEON (resident). Hospital largest traumatic unit in the country and treats over 50,000 new patients each year. Recognised for purpose of casualty by R.C.S. (Eng.). Teaching programme by Consultant staff. 6-month appointment, some of which may be spent in 42-bedded Medical Research Council's Burns Unit.

Apply, naming 2 referees, to Administrator.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. PÆDIATRIC HOUSE PHYSICIAN (Male/Female), vacant 1st August, 1958. Recognised for D.C.H. Includes duties on infectious diseases wards, Neonatal Department, and Clinics.

Applications to Physician-Superintendent by 2nd July, 1958.

BIRMINGHAM. SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. OBSTETRIC HOUSE SURGEON (pre-registration). Vacant beginning of July.

Applications, stating age, qualifications and names of referees, to Medical Superintendent.

BIRMINGHAM. SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. HOUSE SURGEON. Pre-registration post. General hospital offering good experience. 5 other resident medical staff.

Applications, naming 2 referees, to Medical Superintendent.

BIRMINGHAM. SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. HOUSE PHYSICIAN. Pre-registration post, vacant mid-July. General hospital offering good experience. 5 other resident medical staff.

Applications, naming 2 referees, to Medical Superintendent.

BIRMINGHAM. LORDSWOOD MATERNITY HOSPITAL, HARBOURNE, BIRMINGHAM, 17. OBSTETRIC HOUSE OFFICER (resident). Commencing middle of August. 33 Beds dealing with normal and abnormal midwifery. Recognised for D.Obst.R.C.O.G. Second Period Training School for Pupil Midwives.

Applications to the Obstetrician not later than 27th June, 1958.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Dudley Road) Group, Dudley Road Hospital, Birmingham, 18**

REGISTRAR (surgical—resident) required. St. Chad's Hospital, Birmingham, 16. 50 general surgical beds. Recognised for F.R.C.S. Limited married accommodation available.

(2) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

REGISTRAR (surgical), vacant 1st October, 1958. Birmingham Accident Hospital, Bath-row, Birmingham, 15 (215 Beds). Duties with accident surgery team and possibility of transfer to Burns Unit. General surgical experience essential. Higher qualification an advantage.

(3) **Dudley, Stourbridge Group, The Guest Hospital, Dudley**

REGISTRAR (general medicine), whole-time. Wordsley Hospital, near Stourbridge (478 Beds). Experience specialty essential. Higher qualification desirable. Married accommodation available.

(4) **Stafford Group, 13, Foregate-street, Stafford**

(*a*) REGISTRAR (surgery). Duties mainly at Staffordshire General Infirmary, Stafford (175 Beds). Experience specialty and higher qualification desirable. Hospital recognised for F.R.C.S.

(*b*) REGISTRAR (medicine). Duties mainly at Staffordshire General Infirmary, Stafford (175 Beds). Experience specialty and higher qualification desirable.

(5) **Stoke-on-Trent Group, Princes-road, Stoke-on-Trent**

REGISTRAR (orthopædics). North Staffordshire Royal Infirmary (455 Beds). Resident or non-resident, vacant 1st June. Some duties at Hartshill Orthopædic Hospital (77 Beds). Experience specialty essential. Higher qualification an advantage.

Application forms from Group Secretaries to be returned by 30th June, 1958.

BIRMINGHAM, 13. SORRENTO MATERNITY HOSPITAL. (106 Beds, including 24 premature baby cots.) OBSTETRIC HOUSE SURGEON. Recognised for D.Obst. R.C.O.G. Hospital affiliated to Birmingham Medical School for training of students. Vacant 1st August, 1958.

Applications to Obstetrician by 25th June, 1958.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE BIRMINGHAM MATERNITY HOSPITAL. Applications are invited from registered medical practitioners for the post of RESIDENT OBSTETRIC HOUSE SURGEON vacant on 1st September, 1958. The appointment is recognised for the M.R.C.O.G. and D.Obst.R.C.O.G.

Application forms obtainable from the House Governor, the Birmingham and Midland Hospitals for Women, Showell Green-lane, Sparkhill, Birmingham, 11, to be returned not later than 5th July, 1958. G. A. PHALP, Secretary.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE CHILDREN'S HOSPITAL, Ladywood-road, BIRMINGHAM, 16. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Registrar), vacant 7th September, 1958, for 1 year. Preference will be given to applicants with a knowledge of pædiatric surgery and who hold a higher qualification.

Forms of application and details of the post may be obtained from the House Governor and should be returned by 12th July, 1958. G. A. PHALP, Secretary to the Board of Governors.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE CHILDREN'S HOSPITAL, Ladywood-road, BIRMINGHAM, 16. SENIOR HOUSE OFFICER (casualty) required, resident or non-resident, for 1 year from 21st September, 1958. Duties include the reception of acute medical and surgical emergencies, the outpatient treatment of minor conditions, and minor surgical lists. Post recognised for the D.C.H.

Details of the post may be obtained from the House Governor, together with a form of application which should be returned to him by 12th July, 1958.

G. A. PHALP, Secretary to the Board of Governors.

BISHOP'S STORTFORD, HERTFORDSHIRE. HERTS AND ESSEX GENERAL HOSPITAL. Applications invited for post of HOUSE OFFICER (surgical—pre-registration). Salary £467 10s. –£522 10s. p.a. less £125 for residential emoluments. Appointment to commence immediately.

Applications, stating age, nationality, qualifications and experience, with copies of 2 testimonials or names of referees, to Hospital Secretary.

BLACKBURN. ROYAL INFIRMARY. (262 general beds.) BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (casualty and orthopædics) required 11th September, 1958. Recognised for F.R.C.S.

Apply to Group Secretary, Hospital Management Committee, Office, Royal Infirmary, Blackburn.

BLACKBURN. ROYAL INFIRMARY. Blackburn and DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required 7th July, 1958. Recognised for F.R.C.S. and approved for pre-registration purposes.

Applications to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

Royal Infirmary, Blackburn

HOUSE PHYSICIAN required for 23rd July, 1958. Post recognised for pre-registration purposes.

HOUSE SURGEON required for 28th July, 1958. Post recognised for F.R.C.S. and approved for pre-registration purposes.

Queen's Park Hospital, Blackburn

HOUSE SURGEON required 23rd July, 1958. Recognised for F.R.C.S. and approved for pre-registration purposes.

HOUSE PHYSICIAN required 1st August, 1958. Post recognised for pre-registration purposes.

Victoria Hospital, Accrington

HOUSE PHYSICIAN required 1st August, 1958. Post recognised for pre-registration purposes.

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics) required middle of July, 1958, for duties throughout the Group, mainly at Royal Infirmary, Blackburn. Resident at Royal Infirmary, Blackburn. Post recognised for D.A. and F.F.A. R.C.S.

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn, giving names of 2 referees.

BLACKPOOL. VICTORIA HOSPITAL. (354 Beds.) HOUSE OFFICER (orthopædic and traumatic surgery). Resident pre-registration post recognised for F.R.C.S. available from 27th July, 1958, in the main acute general hospital serving the Blackpool and Fylde area.

Applications, stating age, experience (if any) and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BLACKPOOL. VICTORIA HOSPITAL. (354 Beds.) HOUSE SURGEON. Resident pre-registration post available from 23rd July, 1958, in the Department of Surgery at this modern well-equipped hospital with excellent facilities for gaining experience. Recognised for F.R.C.S.

Applications, stating age, experience, and the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BLACKPOOL. VICTORIA HOSPITAL. Casualty Officer (Junior Hospital Medical Officer). This post, vacant on 8th July, is recognised for the F.R.C.S. and offers a variety of experience in a busy department. Residence is optional. Minimum tenure of 1 year. Salary £852 10s.–£55–£1182 10s.

Applications, stating age, qualifications, experience and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BOGNOR WAR MEMORIAL HOSPITAL. (32 Beds.) RESIDENT SENIOR HOUSE OFFICER required to work under visiting Consultant Surgeon and Physician; also casualty work. Salary £819 10s. less £150 p.a. for residence. Modern fully-equipped theatre. Good liaison with Chichester main hospitals and with local general practitioners. Also gives opportunity for postgraduate reading.

Apply, giving 3 referees' names, to Group Secretary, Chichester Group Hospital Management Committee, 174, Broyle-road, Chichester.

BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

RESIDENT ANÆSTHETIST (Senior House Officer grade). Main duties at Bolton Royal Infirmary and Bolton District General Hospital. Now vacant, tenable for 12 months and recognised for the D.A. and F.F.A.R.C.S.

RESIDENT MEDICAL OFFICER (Senior House Officer grade). Vacant 10th August and tenable for 12 months. Successful candidate will be required to reside at Hulton Hospital (131 Beds). Married quarters available. Duties include care of infectious and dermatological cases and some rheumatism and geriatric cases, and may include outpatient and inpatient duties in the Hospitals of the Group.

Bolton District General Hospital (607 Beds)

RESIDENT HOUSE SURGEONS (2). 1 vacant immediately and 1 7th July, tenable for 6 months and recognised under pre-registration service scheme. Also recognised for F.R.C.S.

RESIDENT HOUSE PHYSICIANS (3). Vacant 12th July, 1st August, and 13th August. Tenable for 6 months and recognised under pre-registration service scheme.

The Royal Infirmary, Bolton (238 Beds)

RESIDENT HOUSE SURGEONS (3). Vacant 9th July, 15th July, and 1st August, tenable for 6 months and recognised under pre-registration service scheme. Also recognised for F.R.C.S.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, to Group Secretary, The Royal Infirmary, Bolton.

BOURNEMOUTH (near). CHRISTCHURCH HOSPITAL, CHRISTCHURCH, HAMPSHIRE. (341 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE PHYSICIAN (Pre-registration Interne). The post becomes vacant on 10th August, 1958.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of 3 HOUSE PHYSICIANS. The appointments, which become vacant at the beginning of and mid-August, are recognised for pre-registration purposes.

Applications to the Hospital Secretary.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (314 Beds.) Locum SENIOR CASUALTY OFFICER (Junior Hospital Medical Officer) for 2 weeks, commencing 24th July, 1958.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON (recognised for F.R.C.S.) to the General Surgical Unit (60 Beds). The post will be vacant on 1st August, 1958. Salary in accordance with national scale. The post is recognised as a pre-registration appointment.

Applications, stating age, qualifications, experience and giving the names of 2 referees, should be sent to the Physician-Superintendent, Brighton General Hospital, Elm-grove, Brighton, 7.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON to the Orthopædic Unit. Salary in accordance with national scales. This is a pre-registration appointment. Vacant early in July.

Applications, stating age, qualifications, and experience, and giving the names of 2 referees, should be sent to the Physician-Superintendent, Brighton General Hospital, Elm-grove, Brighton.

BRADFORD ROYAL INFIRMARY, Yorkshire. Senior HOUSE OFFICER (general medicine, with some duties in pathology) required. Post vacant 1st August, 1958.

Applications, stating age, nationality, qualifications and experience, with copy testimonials, to Secretary.

BRADFORD. ST. LUKE'S HOSPITAL. Senior House OFFICER (general medicine and pathology). Vacant 14th July, 1958.

Applications, stating age, nationality, qualifications and experience, with copy testimonials, to Secretary, Royal Infirmary, Bradford.

BROXBURN, WEST LOTHIAN. BANGOUR GENERAL HOSPITAL. (15 miles from Edinburgh.) Applications are invited for the appointment of SENIOR HOUSE OFFICER in the Ophthalmic Unit (32 Beds) at Bangour General Hospital, Broxburn, which is associated with the Ophthalmic Unit of the Royal Infirmary, Edinburgh. Salary and conditions of service will be in accordance with the regulations.

Applications, giving age, qualifications and particulars of previous experience, should be lodged with the Group Secretary and Treasurer, Board of Management, Bangour Hospital, Broxburn, West Lothian.

BURNLEY AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics). The post offers good all-round experience under Consultant staff and is recognised for the Diploma in Anæsthetics. Resident accommodation is available.

Applications, with 2 references, to the Group Secretary, Burnley General Hospital.

BURNLEY AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pædiatrics). This post provides wide and varied experience in all branches of pædiatrics and there is a new Pædiatric Unit at the main Hospital. Post recognised for D.C.H. Good accommodation available.

Applications, with 2 references, to Group Secretary, Burnley General Hospital.

BURNLEY GENERAL HOSPITAL. (641 Beds.) Resident HOUSE OFFICER (medical). The appointment is approved as a pre-registration post. Vacant late July.

Applications, with 2 references, to Group Secretary, Burnley and Distict Hospital Management Committee, Burnley General Hospital.

BURNLEY GENERAL HOSPITAL. (641 Beds.) Resident HOUSE OFFICER (surgical). The appointment is approved as a pre-registration post and recognised for F.R.C.S. Subject to satisfactory service, the successful applicant will be favourably considered for appointment as a House Physician at the termination of his contract as a Surgical House Officer. Position vacant late July.

Applications, with 2 references, to Group Secretary, Burnley and District Hospital Management Committee, Burnley General Hospital.

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE OFFICER (orthopædics) (pre-registration post) required at the above Hospital. Recognised for F.R.C.S.

Applications to Group Secretary as soon as possible.

BURTON-ON-TRENT GENERAL HOSPITAL. Applications are invited for the post of Pre-registration HOUSE SURGEON (general) at the above acute General Hospital of 251 Beds. Recognised for F.R.C.S.

Apply Group Secretary, General Hospital, Burton-on-Trent.

BURTON-ON-TRENT GENERAL HOSPITAL. Junior HOSPITAL MEDICAL OFFICER ANÆSTHETIST required at the above acute General Hospital of 251 Beds. Recognised for D.A.

Applications to Group Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL. Applications invited for the post of SENIOR HOUSE OFFICER in Casualty. The post, which is recognised for the examination of the F.R.C.S., will be vacant mid-July.

Apply, stating full details of experience, &c., and names of 2 referees, to H. WILKINSON, Group Secretary, Bury General Hospital.

BURY GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER in Medicine.

Apply, stating full details as to experience, qualifications, nationality, and names of 2 referees, to H. WILKINSON, Group Secretary, Bury General Hospital, Bury, Lancs.

BUSHEY MATERNITY HOSPITAL, Bushey Heath, HERTFORDSHIRE. (50 Beds.) RESIDENT OBSTETRIC HOUSE SURGEON for above Hospital. Duties include antenatal and other clinics at the Edgware General Hospital, Edgware, Middlesex. Post vacant 4th July, 1958. 6 months' appointment. Post recognised for D.Obst.R.C.O.G. and for pre-registration purposes.

Applications, stating age, qualifications, experience, and enclosing copies of up to 3 recent testimonials, to Medical Administrator of Hospital immediately.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Senior REGISTRAR or REGISTRAR (Radiotherapy Department) required as soon as possible.

Apply, with full particulars and names of 3 referees, to the Secretary by 4th July.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. RESIDENT REGISTRAR at Brookfields Hospital, Cambridge. This Hospital has 2 wards for infectious diseases, 1 for general medicine, and 1 for tuberculosis, and is the Poliomyelitis Centre for the south west section of East Anglia. Appointment for 1 year in first instance, renewable for a second year.

Apply, with full particulars and names of 3 referees, to Secretary, Addenbrooke's Hospital, Cambridge, by 28th June.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. CASUALTY OFFICER, Senior House Officer grade, 1 year from mid-August.

Apply to the Secretary, stating age, nationality, qualifications and experience, with dates, and with copies of 3 testimonials, by 5th July.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of SENIOR HOUSE PHYSICIAN becomes vacant at the end of July, 1958. Salary £819 10s. p.a. with National Health Service conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of OBSTETRIC HOUSE SURGEON, which is recognised for the M.R.C.O.G. and D.Obst.R.C.O.G. becomes vacant towards the end of July, 1958. National Health Service salary and conditions.

Applications, together with 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (pathology), which becomes vacant mid-July, 1958, for 1 year. Salary £819 10s. p.a., with National Health Service conditions. Experience in pathology not essential but candidates must have had previous clinical experience.

Applications, stating age, qualifications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF. GLAN ELY HOSPITAL, Fairwater, Cardiff. There is a vacancy for a SENIOR HOUSE OFFICER at this Hospital, which has 240 Beds, for the treatment of tuberculosis —both pulmonary and non-pulmonary—and allied chest conditions. Experience available in thoracic surgery and operative treatment of bone and joint, genito-urinary, and glandular tuberculosis.

Form of application from Group Secretary, 44, Cathedral-road, Cardiff.

CARDIFF HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (non-resident) required to commence end of July in Casualty Department, with duties in Observation Unit of St. David's Hospital, Cardiff.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF ISOLATION HOSPITAL. (219 Beds.) Senior HOUSE OFFICER required at above Hospital. Hospital serves wide area, gives opportunity for study of infectious diseases; has poliomyelitis respiratory unit and medical and convalescent beds. Post vacant late August.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF (near). PRINCE OF WALES ORTHOPÆDIC HOSPITAL, RHYDLAFAR, near CARDIFF. SENIOR HOUSE OFFICER required at above Hospital. Married or single accommodation available.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. ROOKWOOD HOSPITAL. Senior House OFFICER (surgical) required at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER (resident) required immediately in Geriatric Unit (200 Beds) at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARLISLE. CUMBERLAND INFIRMARY, CITY GENERAL HOSPITAL and CITY MATERNITY HOSPITAL. Applications are invited for the following appointments:—

SENIOR HOUSE OFFICER (general medicine). 6 months' or 12 months' period from 1st August, 1958.

HOUSE OFFICER (obstetrics and gynæcology). Recognised for D.Obst.R.C.O.G. and pre-registration. 6 months' period from 1st August, 1958.

HOUSE OFFICER (mainly gynæcology with some obstetrics). Pre-registration. 6 months' period from 1st September, 1958, or earlier.

SENIOR HOUSE OFFICER (orthopædics). 6 months' or 12 months' period. Now vacant.

Applications, with 2 names for reference purposes, to be sent to the Group Secretary, East Cumberland Hospital Management Committee, Cumberland Infirmary, Carlisle.

CARLUKE, LANARKSHIRE. LAW HOSPITAL. (790 Beds.) Applications are invited for the following posts, commencing 1st August, 1958:—

(*a*) JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER (orthopædic).

(*b*) Pre-registration HOUSE OFFICER (orthopædic). This post can, if so desired, be held part of the time in orthopædic surgery and part in general surgery.

The Orthopædic Unit has 120 Beds and deals with the accident work from a considerable part of Lanarkshire.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be submitted to the Group Medical Superintendent as soon as possible.

CARSHALTON, SURREY. ST. HELIER HOSPITAL. SURGICAL REGISTRAR to the Thoracic Unit (non-resident). Post recognised for F.R.C.S. Vacant 1st October.

Forms of application, returnable by 2nd July, from the Group Secretary at above address.

CHELMSFORD. ST. JOHN'S HOSPITAL. Applications are invited from registered practitioners for the post of RESIDENT PÆDIATRIC HOUSE OFFICER (Male or Female), commencing as soon as possible. To work in the Pædiatric Unit of the Chelmsford Hospital Group. The Unit includes a Premature Baby Nursery of 10 Cots, and a Neonatal Department in the maternity block of the Hospital. The Department is recognised for the D.C.H.

Applications, stating age, nationality, qualifications and experience, together with recent testimonials, should be forwarded immediately to the Group Secretary, Chelmsford Group Hospital Management Committee, Chelmsford and Essex Hospital, London-road, Chelmsford.

CHELMSFORD HOSPITAL MANAGEMENT COMMITTEE. Resident Locum MEDICAL AND PÆDIATRIC REGISTRAR required from 24th June, for approximately 2 months.

Applications to Secretary, Chelmsford Hospital Management Committee, Chelmsford and Essex Hospital, London-road, Chelmsford.

CHELTENHAM GENERAL HOSPITAL. (220 Beds.) HOUSE SURGEON required (pre- or post-registration). The post offers a wide experience in general surgery, gynæcology, and orthopædic surgery. Post recognised for the F.R.C.S.

Apply, with names of 2 referees, to the Secretary, General Hospital, Cheltenham.

CHESTER-LE-STREET GENERAL HOSPITAL. (204 Beds.)

HOUSE PHYSICIAN (general medicine). Approved pre-registration post.

SENIOR HOUSE OFFICER (general surgery). Post recognised under F.R.C.S. regulations.

HOUSE SURGEON (general surgery). Approved pre-registration appointment, and recognised under F.R.C.S. regulations.

Posts vacant 1st August, 1958.

Apply, with names and addresses of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

CHICHESTER. GRAYLINGWELL HOSPITAL. South WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER. The post, which is a trainee post, offers wide experience in all branches of adult psychiatry, both inpatient and outpatient. In addition to 3 outpatient clinics and other extra-mural activities, Graylingwell Hospital has an admission-rate of over 1000 patients a year, and it has Departments of Pathology, Psychology, Electroencephalography, Clinical Research, and Neurology. The successful applicant will work under the direction of the senior medical staff and will also receive formal tuition by the Director of Research. Accommodation for a married man is available.

Applications, giving details of experience, and the names of 3 referees, should be sent to the Medical Superintendent not later than 2 weeks after the appearance of this advertisement.

CHICHESTER. ST. RICHARD'S HOSPITAL. (400 Beds.) CHICHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Required HOUSE SURGEON (pre-registration), for 6 months only in the first instance. Post vacant mid-July, 1958. The Man or Woman appointed will work primarily in the surgical wards of the Hospital. Hospital recognised for F.R.C.S.

Applications, stating age, qualifications and experience, giving names of 2 persons from whom reference may be obtained, should be sent to the Surgeon-Superintendent.

COLCHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications invited for:—

Black Notley Hospital, Braintree, Essex (522 Beds)

Post of SENIOR HOUSE OFFICER for Non-Pulmonary Tuberculosis Unit of approximately 120 Beds, particularly for skeletal and renal tuberculosis; also rheumatoid arthritis cases and spastic children. Recognised for F.R.C.S.

Post of HOUSE OFFICER (orthopædic surgery). Duties include care of cases from London Hospital Orthopædic Department. Pre-registration or third post, tenable for 6 months. Recognised for F.R.C.S.

Post of HOUSE PHYSICIAN. Pre-registration or third post. Includes duties in medical and pædiatric wards. Tenable for 6 months.

Post of HOUSE SURGEON. Pre-registration or third post. Includes duties in general surgical and gynæcological wards. Recognised for F.R.C.S. Tenable for 6 months.

Clacton and District Hospital, Clacton-on-Sea, Essex (58 Beds)

Post of SENIOR HOUSE OFFICER. Duties include medical, surgical, and casualty work. Post tenable for 6 months or 1 year.

Essex County Hospital, Colchester, Essex (181 Beds)

Post of HOUSE SURGEON. Pre-registration or third post, tenable for 6 months. Recognised for F.R.C.S.

Essex County Hospital, Colchester (19 gynæcological beds); **Colchester Maternity Hospital** (22 obstetric beds)

Post of HOUSE OFFICER (Male or Female) (obstetric and gynæcological). Pre-registration or third post, tenable for 6 months.

Applications, with copies of 3 testimonials, to Group Secretary, 14, Pope's-lane, Colchester, Essex.

CUCKFIELD HOSPITAL, Cuckfield, near Haywards HEATH. MID-SUSSEX HOSPITAL MANAGEMENT COMMITTEE. Vacant posts:

RESIDENT SENIOR HOUSE OFFICER (Orthopædic and Traumatic Unit). Post registered for Fellowship—vacant 1st August.

RESIDENT JUNIOR HOUSE OFFICER (general surgery). Pre-registration post vacant 5th July.

Applications to Hospital Secretary, giving age, nationality and experience and names of 2 referees.

CHESTERFIELD. SCARSDALE HOSPITAL. (72-Bed maternity unit.) SENIOR HOUSE OFFICER (obstetrics and gynaecology) required 1st July at above Hospital. Post recognised for M.R.C.O.G. and D.Obst.R.C.O.G. purposes. National salary and conditions.

Please apply M. H. BOONE, Group Secretary, Chesterfield Hospital Management Committee, at Chesterfield Royal Hospital.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (416 Beds.) HOUSE PHYSICIAN (pre-registration) or SENIOR HOUSE OFFICER (general medicine), vacant early July.

Apply, stating full details with copies of 2 testimonials, to Secretary.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) Applications invited for post of HOUSE OFFICER or SENIOR HOUSE OFFICER (paediatrics), vacant 16th July, 1958, tenable for 6 months. Duties mainly surgical, but includes some medicine. Post recognised for D.C.H. and is open to pre-registration graduates.

Applications, with names of 2 referees, to be sent as soon as possible to Secretary.

DERBY. KINGSWAY HOSPITAL. (912 Beds. Recognised for D.P.M.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (psychiatry) required 10th August. Facilities for postgraduate study in conjunction with Sheffield University available. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DONCASTER HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN (Senior House Officer) required between Western Hospital, Doncaster, and Doncaster Royal Infirmary. Resident at Western Hospital. Post vacant early July.

Applications, with particulars of experience and copies of 2 recent testimonials, to the Group Secretary at Doncaster Royal Infirmary.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) HOUSE SURGEON (first, second or third post). Vacant early July. General surgery, casualty and some orthopaedics. Approved pre-registration post. Fully registered practitioners may apply.

Applications to Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) JUNIOR HOUSE PHYSICIAN, vacant now. Approved pre-registration post, but fully registered practitioners may apply. Duties to include geriatrics and acute medicine. Good general experience for first house appointment.

Apply Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) SENIOR HOUSE PHYSICIAN. Vacant now. Duties to include acute and chronic medicine.

Detailed applications, with reference, to the Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP, BIRMINGHAM REGION.

The Corbett Hospital, Stourbridge (114 Beds).

HOUSE OFFICER (surgical), pre-registration. Post vacant now.

Applications, naming 2 referees, to Group Secretary, Guest Hospital, Dudley, Worcs.

HOUSE OFFICER (medical), pre-registration. Post vacant July, 1958.

Apply Group Secretary, Guest Hospital, Dudley, Worcs.

Wordsley Hospital, near Stourbridge (478 Beds)

SENIOR HOUSE OFFICER (medical). Post vacant end of June, 1958.

HOUSE OFFICER (medical), pre-registration. Post vacant July, 1958.

Apply, Group Secretary, Guest Hospital, Dudley, Worcs.

The Guest Hospital, Dudley (154 Beds)

SENIOR HOUSE OFFICER (anaesthetics). Post recognised for D.A. Successful candidate will be required to visit other hospitals in the Group.

Applications, giving the names of 2 referees, to the Group Secretary, Guest Hospital, Dudley, Worcs.

SENIOR HOUSE OFFICER (surgical). Post vacant July, 1958.

HOUSE OFFICER (surgical), pre-registration. Post vacant July, 1958.

HOUSE OFFICER (medical), pre-registration. Post vacant July, 1958.

Apply Group Secretary, Guest Hospital, Dudley, Worcs.

DURHAM. DRYBURN HOSPITAL. (309 Beds.) House PHYSICIAN (Paediatric Unit of 42 Beds). Approved pre-registration appointment and recognised for D.C.H. Post vacant 1st August, 1958.

Apply, with names and addresses of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR, Newmarket General Hospital (338 Beds). Post recognised for D.A. Appointment for 1 year, renewable for second year.

Applications, stating age, experience and the names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 7th July, 1958. Candidates invited to visit the Hospital by direct arrangement with the Physician-Superintendent at the Hospital.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE SURGEON required 28th July for Orthopaedic, E.N.T. and Eye Departments. Pre-registration post recognised for F.R.C.S.

Applications, stating age, qualifications and experience, with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) Applications are invited for pre-registration post of HOUSE SURGEON. Salary in accordance with Whitley scale. 4 residents on staff. Post vacant mid-August.

Apply to the Secretary, Noble's Hospital, Douglas, Isle of Man.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) Locum SENIOR HOUSE OFFICER ANÆSTHETIST required until 31st July. Resident or non-resident.

Apply to the Secretary, Noble's Isle of Man Hospital, Douglas.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) SENIOR HOUSE SURGEON required at this busy general hospital. Suitable post for candidate seeking further clinical experience and reading for higher qualifications. Recognised for F.R.C.S. 4 House Officer posts. National Health Service salary and conditions. Post becomes vacant early June.

Apply, giving usual particulars, and names of 2 referees, to the Secretary, Noble's Isle of Man Hospital, Douglas.

EBBW VALE GENERAL HOSPITAL. (General beds 71, maternity 15.) Applications are invited for the vacancy of JUNIOR HOSPITAL MEDICAL OFFICER. Staff comprises of Resident Consultant Surgeon, visiting Orthopaedic, Gynaecological and Ophthalmic Surgeons, and Resident House Officer. Appointment shall be for a period not exceeding 4 years.

Apply, with full details and references, to Group Secretary, North Monmouthshire Hospital Management Committee, Nevill Hall Hospital, Abergavenny, Mon.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (704 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. CASUALTY REGISTRAR, whole-time, required at above Hospital. Post recognised for F.R.C.S. purposes. Hospital may be visited by direct appointment with Medical Administrator.

Application forms obtainable from and returnable to Group Secretary, Edgware General Hospital, by 1st July, 1958.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (704 Beds.) Part-time CLINICAL ASSISTANT required for up to 4 sessions per week in the Department of Physical Medicine at above Hospital. Salary £183 15s. p.a. per weekly notional half-day. Post vacant 1st September, 1958.

Applications, stating age, qualifications and experience and the names and addresses of 2 referees, to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edgware, Middlesex, by 5th July, 1958.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex, and BUSHEY MATERNITY HOSPITAL. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. RESIDENT REGISTRAR (obstetrics and gynaecology) for above Hospital. Possession of higher qualification desirable. The successful candidate will be required to be in residence at Bushey Maternity Hospital, Bushey Heath, Hertfordshire (4½ miles from Edgware), where married quarters are available if required. Hospitals may be visited by direct appointment with the Medical Administrator, Edgware General Hospital.

Application forms obtainable from and returnable to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edgware, Middlesex, by 1st July, 1958.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. RESIDENT HOUSE SURGEON—approved pre-registration or post-registration post. Vacant 16th August, 1958. Duties with a general surgical unit. Post recognised by the Royal College of Surgeons. 6 months' appointment.

Applications, with the names and addresses of 2 referees, to the Group Secretary, Enfield Group Hospital Management Committee, at Chase Farm Hospital.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. Locum SURGICAL REGISTRAR required for General Surgery for at least 1 month. Must possess F.R.C.S.

Applications, with names and addresses of 2 referees, to the Group Secretary, Enfield Group Hospital Management Committee, Chase Farm Hospital.

ENFIELD. WAR MEMORIAL HOSPITAL, Chase Side, ENFIELD, MIDDLESEX. RESIDENT SENIOR HOUSE OFFICER required immediately for general medical and surgical duties in acute general hospital of 61 Beds. 12-month appointment.

Applications, with names and addresses of 2 referees, to the Group Secretary, Enfield Group Hospital Management Committee, Chase Farm Hospital, The Ridgeway, Enfield, Middlesex.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER as Casualty Officer and Orthopaedic House Surgeon. Post now vacant. Recognised for F.R.C.S.

Applications, with copies of 2 recent testimonials, to be sent immediately to Group Secretary, Epping Group Hospital Management Committee, Oak Cottage, The Plain, Epping, Essex.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER (chest diseases and casualty) required for Tuberculosis Wards in busy general hospital. 40 chest diseases beds run in conjunction with clinic within the grounds. Good experience. Modern methods of treatment. Candidate required to devote one-third of time to casualty duties. Appointment vacant 2nd August, 1958—locum appointment available for preceding fortnight.

Applications, with copies of 2 recent testimonials, to be sent to the Group Secretary, Epping Group Hospital Management Committee, Oak Cottage, The Plain, Epping, Essex, by 4th July, 1958.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (Fracture Department), vacant 25th July, 1958.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (E.N.T. Department—30 Beds). Vacant now. The post is recognised for the F.R.C.S. examination.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary.

ELLESMERE PORT HOSPITAL. Resident Medical OFFICER (Junior Hospital Medical Officer). This is an acute hospital (42 Beds) at which regular Consultant outpatient clinics are held. A furnished semi-detached house is available at a reasonable rental for married practitioners.

Applications, giving full details together with the names of 2 referees, should be forwarded to the Group Secretary, 5, King's-buildings, Chester.

GLASGOW, S.W.1. SOUTHERN GENERAL HOSPITAL. JUNIOR HOUSE OFFICER in Paediatrics (with duties in Dermatological Department) required August, 1958.

Apply to Medical Superintendent.

GLASGOW, S.W.1. SOUTHERN GENERAL HOSPITAL. JUNIOR HOUSE OFFICER in Psychiatry required 1st August, 1958. New Unit in conjunction with University Department of Psychological Medicine. Full programme in undergraduate and postgraduate education undertaken.

Apply to Medical Superintendent.

GRAVESEND AND NORTH KENT HOSPITAL, GRAVESEND, KENT. MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON. Applications are invited for this pre-registration post, vacant now. Post offers experience in obstetrics, gynaecology and orthopaedics, as well as general surgery. Salary £467 10s.–£577 10s. p.a., according to experience.

Applications, stating age, qualifications, nationality and experience, to Hospital Secretary.

GRIMSBY HOSPITAL MANAGEMENT COMMITTEE. 2 HOUSE PHYSICIANS (pre-registration) required in July, 1 for Scartho Road Hospital and 1 for Grimsby General Hospital. Units of 35 and 46 Beds respectively. Medical library and reading facilities available.

Applications for either post, with names of 2 referees, to the Hospital Secretary, Grimsby General Hospital, Grimsby.

GRIMSBY GENERAL HOSPITAL. Senior House Officer required for Casualty Department. Establishment consists of Senior Casualty Officer and 2 Senior House Officers. Excellent medical library taking principal periodicals.

Applications, with names of 2 referees, to Hospital Secretary.

GRIMSBY GENERAL HOSPITAL. Locum Casualty OFFICER (Senior House Officer grade) required. Establishment consists of Senior Casualty Officer and 2 Senior House Officers. Medical library and reading facilities available.

Applications, with names of 2 referees, to Hospital Secretary.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. (233 Beds.) CASUALTY OFFICER (Senior House Officer) required immediately. Post recognised for F.R.C.S. examination. 2 Casualty Officers are employed, sharing the work of the department and the orthopaedic and traumatic unit, including fracture clinics. Regular instruction is given in traumatic surgery.

Applications, with copies of testimonials, to the Hospital Secretary.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. RESIDENT HOUSE SURGEON required for general surgery. Post is vacant on 6th July and tenable for 6 months. It is approved for pre-registration candidates and recognised for the F.R.C.S. examination.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary as soon as possible.

HALIFAX. ROYAL HALIFAX INFIRMARY. (301 Beds.) SENIOR HOUSE OFFICER in Casualty and Orthopaedic Surgery required. Post recognised for F.R.C.S. and is vacant 1st July, 1958. Salary £819 10s. p.a. with deduction of £150 p.a. for board-residence, &c.

Apply to Group Secretary, Royal Halifax Infirmary, Halifax.

HAREFIELD HOSPITAL, Harefield, Middlesex. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR required at above Hospital. Previous experience in general medicine and in the treatment of tuberculosis essential. Hospital has approximately 450 Beds for the treatment of tuberculosis in all its forms, a non-tuberculous thoracic surgical unit of 100 Beds and 100 general medical and surgical beds. Successful candidate will be required to work on wards for the treatment of tuberculosis in women and children and on an observation ward for the diagnosis of diseases of the chest. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to the Group Secretary, Harefield and Northwood Group Hospital Management Committee, Mount Vernon Hospital, Northwood, Middlesex, by 1st July, 1958.

HAROLD WOOD HOSPITAL, Harold Wood, Essex (near London). (415 Beds.) SENIOR HOUSE OFFICER (paediatrics). Main general and casualty hospital of Brentwood Group. Recognised for D.C.H.

Apply to Hospital Secretary (Telephone: Ingrebourne 2881).

HASLEMERE AND DISTRICT HOSPITAL, Hasle-MERE, SURREY. Locum Tenens SURGICAL REGISTRAR (general) required. 14th–26th July, 1958, inclusive. £19 5s. per week less £170 p.a. for residence.

Applications to Hospital Secretary.

HASLEMERE AND DISTRICT HOSPITAL. (83 Beds.) GUILDFORD GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER (surgical with charge of 12 acute medical beds). Duties to commence 10th September, 1958. Valuable experience in general and emergency surgery, orthopaedic, E.N.T., gynaecological, children and casualty work. Cottage available October.

Applications to Hospital Secretary, Haslemere and District Hospital, Haslemere, Surrey, by 12th July, 1958, with names of 3 referees.

HASTINGS GROUP HOSPITAL MANAGEMENT COM-MITTEE. Locum NON-RESIDENT MEDICAL OFFICER required. Post vacant now. Salary £19 5s. per week.

Apply, with full details of experience, with copies of 3 references or the names of 3 referees, to Group Secretary, 11, Holmesdale-gardens, Hastings.

HASTINGS AND ST. LEONARDS. BUCHANAN HOS-PITAL (Obstetric, Gynaecological, and Premature Baby Unit—91 Beds.) SENIOR HOUSE OFFICER required for Obstetric and Premature Baby Unit. Appointment, recognised for M.R.C.O.G., is vacant 16th July, 1958.

Applications, giving names and addresses of 3 referees, should be addressed to Hospital Administrator.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (150 Beds.) HOUSE SURGEON. Pre-registration post for general surgery and urology required at this acute hospital (surgical) immediately.

Applications, with names of 2 referees, to Administrator.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (150 Beds.) Locum HOUSE SURGEON required. Pre-registration or Senior House Officer, according to experience.

Apply to Administrator.

HASTINGS. ST. HELEN'S HOSPITAL. (493 Beds.) HOUSE PHYSICIAN required. Pre-registration post. Staff of 5.

Applications immediately to Hospital Administrator.

HAYWARDS HEATH, SUSSEX. ST. FRANCIS HOSPI-TAL. 2 SENIOR HOUSE OFFICERS (psychiatry) (resident) required at the above Hospital. Opportunities for obtaining experience in all branches of psychiatry and neurology. Salary in accordance with the terms and conditions of service with appropriate deduction for residence.

Applications, with the names and addresses of 3 referees, to the Secretary to the Hospital Management Committee, St. Francis Hospital, Haywards Heath, Sussex.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. 2 HOUSE SURGEONS (pre-registration) required.

Applications, giving full details and 2 names for reference, should be sent to the Hospital Secretary as soon as possible.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for the appointment of HOUSE SURGEON (general, first or second post) to commence as soon as possible. Pre-registration post; recognised under F.R.C.S. regulations.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for the appointment of HOUSE SURGEON (general surgery, gynaecology and obstetrics) (first or second post). To commence 9th July, 1958. Pre-registration post; recognised under F.R.C.S. regulations.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HIGH WYCOMBE, BUCKINGHAMSHIRE. WAR MEMO-RIAL HOSPITAL. (100 Beds.) Pre-registration HOUSE PHYSICIAN required for 6 months. Post vacant 21st July.

Apply immediately, with names of 2 referees, to Secretary.

HIGH WYCOMBE, BUCKINGHAMSHIRE. WAR MEMO-RIAL HOSPITAL. (100 Beds.) Pre-registration or post-registration HOUSE OFFICER required for 6 months for general surgery and orthopaedics.

Apply immediately, with names of 2 referees, to the Secretary.

HIGH WYCOMBE, BUCKINGHAMSHIRE. WAR MEMO-RIAL HOSPITAL. E.N.T. AND GENERAL HOUSE SURGEON required. Married accommodation available.

Apply to Secretary.

HIGH WYCOMBE, BUCKINGHAMSHIRE. WAR MEMORIAL HOSPITAL. (100 Beds.) SENIOR RESIDENT HOUSE PHYSICIAN required. Post vacant 13th July.

Apply immediately, with copies of testimonials or names of 2 referees, to the Secretary.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (621 Beds.) REGISTRAR required in Department of Anaesthetics. Resident or non-resident. Post recognised for F.F.A. R.C.S. Candidates may visit Hospital by direct appointment.

Application forms obtainable from and returnable to Group Secretary, Uxbridge Group Hospital Management Committee, The Furze, Field Heath-road, Hillingdon, Middlesex, by 30th June.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (621 Beds.) PAEDIATRIC REGISTRAR—previous paediatric experience essential. Duties include experience in children's medical ward, neonatal unit, and paediatric outpatient clinics. Unit recognised for D.C.H. Candidates may visit Hospital by direct appointment.

Application forms obtainable from and returnable to Group Secretary, Uxbridge Group Hospital Management Committee, The Furze, Field Heath-road, Hillingdon, Middlesex, by 30th June.

HITCHIN, HERTFORDSHIRE. LISTER HOSPITAL. HOUSE SURGEON (resident) for duty with Accident Service and as Orthopaedic House Surgeon, required 4th July. Recognised as pre-registration post.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to Medical Administrator, Lister Hospital.

HITCHIN, HERTFORDSHIRE. LISTER HOSPITAL. RESIDENT HOUSE PHYSICIAN now required. Recognised as pre-registration post.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Administrator, Lister Hospital.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from provisionally registered medical practitioners for the post of HOUSE PHYSICIAN to commence duties on 1st July, 1958. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required to commence duty on 6th August, 1958. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scales.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD. MILL HILL HOSPITAL. (132 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade, £852 10s.–£55–£1182 10s. p.a.) at above Hospital. The present allocation of beds is 28 for infectious diseases and 104 for geriatric patients.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD. ST. LUKE'S HOSPITAL. (235 Beds.) Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade) at the above Hospital, to commence duties on 7th August, 1958. The Group Geriatric Admission Unit is based on this Hospital, which also caters for acute medical and surgical, paediatric, and maternity patients. Salary in accordance with the terms and conditions of service for hospital medical and dental staff, £852 10s.–£55–£1182 10s. p.a. House available for married candidate.

Applications, together with copies of 3 recent testimonials, to be sent to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD. ST. LUKE'S HOSPITAL. (235 Beds.) Applications are invited for the post of RESIDENT MEDICAL OFFICER (Senior House Officer grade) at the above Hospital, to commence duties immediately. The Group Geriatric Admission Unit is based on this Hospital, which also caters for acute medical and surgical, paediatric, and maternity patients. Salary in accordance with the terms and conditions of service for hospital medical and dental staff, £819 10s. p.a.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.
The Royal Infirmary, Huddersfield.

HULL. KINGSTON GENERAL HOSPITAL. (419 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT HOUSE PHYSICIAN (pre-registration post). Vacant mid-July.

Applications, with 2 recent testimonials, to the Hospital Secretary.

HULL. VICTORIA HOSPITAL FOR SICK CHILDREN, Park-street. (115 Beds.) HOUSE SURGEON required on 1st August, 1958. Pre-registration or registration post. Recognised for D.C.H. An interesting and varied post which includes outpatient and casualty work.

Applications, together with details of experience, testimonials, &c., to the Hospital Secretary.

ILKLEY. MIDDLETON HOSPITAL. (386 Beds.) RESIDENT SENIOR HOUSE OFFICER (surgical) required for Major Thoracic Surgical Unit at the above Hospital. Eminently suitable for person intending to take Membership or Fellowship examination.

Applications, stating age, nationality, qualifications and experience, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL (Heath-road WING), IPSWICH. (280 Beds.) HOUSE SURGEON, Obstetric and Gynæcological Department, required 17th August, 1958.

Applications, giving full details and copies of 3 recent testimonials, to Hospital Secretary.

IPSWICH. ST. HELEN'S HOSPITAL. (129 Beds for infectious diseases, pulmonary tuberculosis, long-stay orthopædics and geriatrics. The area Chest Clinic is in the Hospital.) HOUSE PHYSICIAN required (post-registration appointment). Accommodation available for married man.

Applications to JOHN WILLIAMS, Group Secretary, Ipswich Group Hospital Management Committee, at the Ipswich and East Suffolk Hospital (Anglesea-road Wing), Ipswich.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston UPON THAMES. KINGSTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from suitably qualified medical officers for the post of HOUSE OFFICER (general medicine) (pre-registration) which is available on 1st August, 1958.

Applications, stating age, qualifications and experience, with 2 recent testimonials, should reach the Physician-Superintendent of the Hospital within 7 days of the appearance of this advertisement.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston UPON THAMES. Applications are invited from suitably qualified and experienced medical officers for the post of CASUALTY REGISTRAR (full-time) at Kingston Hospital. Commencing 8th September, 1958. Duties are daily from 9.30 A.M. to 5.30 P.M. and 1 night duty each week. Except for duty night the post is non-resident, but quarters are available if desired. The post is recognised for F.R.C.S. purposes.

Forms of application may be obtained from the Group Secretary, Kingston Group Hospital Management Committee, 33, Coombe-road, Kingston upon Thames, to whom they should be returned as soon as possible.

KIRKCALDY. FORTH PARK MATERNITY HOSPITAL. (51 obstetrical beds and 15 premature baby and special care cots.) RESIDENT OBSTETRICAL HOUSE OFFICER required to commence duty on 1st October, 1958. The post qualifies for pre-registration.

Apply, in writing, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

KIRKCALDY GENERAL HOSPITAL. (74 surgical beds.) HOUSE OFFICERS required, 2 on 1st August, 1958, and 2 on 1st October, 1958, for 6 months. The posts are resident and qualify for pre-registration.

Apply, in writing, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

KIRKCALDY. VICTORIA HOSPITAL. (65 acute medical beds and 48 acute geriatric beds.) 3 HOUSE OFFICERS required to commence duties on 1st October, 1958, and 1st April, 1959, for 6 months. All posts are resident and qualify for pre-registration, and those appointed will work in the Acute Medical Unit under the Consultant Physician.

Apply, in writing, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

KILMARNOCK INFIRMARY. (147 Beds.) House Officer (medical)—2 posts, vacant 1st August. Wide experience under Consultant supervision. Resident. National terms.

Apply immediately Area Medical Superintendent, 1, Hill-street, Kilmarnock (Telephone: Kilmarnock 1300).

LLANELLY. BRYNTIRION HOSPITAL. (156 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the temporary post of JUNIOR HOSPITAL MEDICAL OFFICER for work in the Chronic Sick Wards of the above Hospital. The post will be for a period of 6 to 12 months. Accommodation is available for a single person.

Applications, stating age, experience and qualifications, together with copies of 2 recent testimonials, should be addressed to the undersigned at Glantawe Hospital Management Committee, St. Helen's-road, Swansea.

T. E. JONES, Group Secretary.

LLWYNYPIA HOSPITAL, Llwynypia, Rhondda. Ponty-PRIDD AND RHONDDA HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (medicine) required immediately. The person appointed will be required to undertake duties at the Llwynypia Hospital (40 acute medical beds and 78 chronic sick beds), Glyncornel Hospital (56 chronic sick beds), and Tyntyla Isolation Hospital (42 Beds).

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent immediately to the Group Secretary, Pontypridd and Rhondda Hospital Management Committee, Courthouse-street, Pontypridd.

LEEDS. THE UNITED LEEDS HOSPITALS. Applications are invited for the post of HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER at the Chapel Allerton Hospital, post vacant now. The post offers experience in E.N.T., ophthalmic and neurosurgery.

Applications, stating age, qualifications and the names of 3 referees, should be sent immediately to the Secretary to the Board, General Infirmary, Leeds, 1.

LEEDS. UNITED LEEDS HOSPITALS/LEEDS REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in Psychiatry associated with the Leeds University Department of Psychiatry. The successful candidate will undertake duties in connection with the clinical, teaching and research work of the Department at the General Infirmary and St. James's Hospital, Leeds. Candidates should hold high medical qualifications and a diploma in Psychological Medicine or equivalent.

Applications stating age, qualifications and details of appointments held showing dates, together with the names and addresses of 3 referees, should be forwarded to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 9th July, 1958.

LEEDS. UNIVERSITY OF LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for appointment as SENIOR REGISTRAR AND TUTOR in Psychiatry. The successful candidate will be a member of the University Department of Psychiatry and the duties will include work at the General Infirmary at Leeds with which the University Department is associated and such other duties as may be assigned to him by the Head of the University Department.

Applications (3 copies), stating date of birth, qualifications, and details of present and previous appointments with dates, and experience of teaching, together with the names of 3 referees, should reach the Registrar, The University, Leeds, 2 (from whom further particulars may be obtained), not later than 1st July, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

General Surgery

Huddersfield Group (100 general surgical beds). Residential accommodation available. Duties mainly at Huddersfield Royal Infirmary. Recognised for F.R.C.S. May include some duties in the Casualty Department.

Psychiatry

Menston Hospital, near Leeds (2500 Beds). Residential accommodation can be provided for a single person. If desired, facilities for attendance at the University of Leeds will be provided if the successful candidate is studying for the D.P.M.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, The Joint Registrars Committee, Park Parade, Harrogate, by 25th June, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Senior REGISTRAR vacancies.

Anæsthetics

Hull A Group of hospitals with additional duties as required in the Hull B and East Riding Groups. Non-resident.

Psychiatry

St. James's Hospital, Leeds (General Hospital Psychiatric Unit). Candidates must hold the D.P.M. or equivalent qualification. This appointment offers excellent opportunity for experience in dealing with neurosis. The work will be in association with the University Department of Psychiatry; research and teaching may be undertaken.

Applications stating age, qualifications and details of appointments held showing dates, together with the names and addresses of 3 referees, should be forwarded to the Secretary, Park-parade, Harrogate, by 9th July, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Anæsthetics

Huddersfield Group (approximately 225 Beds in the surgical specialties). Non-resident.

General Surgery

Hull Royal Infirmary (80 general surgical beds) and other hospitals in the Hull A Group including additional duties in the Casualty Department. Non-resident.

Obstetrics and Gynæcology

Hospitals in the Hull A Group (84 obstetric and 91 gynæcological beds). Recognised for M.R.C.O.G. Resident.

Orthopædic Surgery

Woodlands Orthopædic Hospital, Rawdon (100 Beds) and Orthopædic Outpatient Department, Bradford Royal Infirmary. Offers excellent training in all branches of accident and orthopædic surgery.

Psychiatry

Storthes Hall Hospital, Huddersfield (2750 Beds). Facilities for attendance at the Leeds University will be provided if the successful candidate is studying for the D.P.M.

Applications, stating age, qualifications and details of present and previous appointments, with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 2nd July, 1958.

LINCOLN COUNTY HOSPITAL, Sewell-road, Lincoln. (200 Beds.) Applications are invited from Men and Women for the post of RESIDENT HOUSE PHYSICIAN. This is an approved pre-registration post. The vacancy will occur on 2nd August, 1958.

Applications, with copy testimonials, should be sent to the Group Secretary, Lincoln County Hospital as soon as possible.

LINCOLN COUNTY HOSPITAL, Sewell-road, Lincoln. (200 Beds.) Applications are invited from Men and Women for 2 posts of RESIDENT HOUSE SURGEON. These are approved pre-registration posts which will be vacant on 1st August, 1958. The duties are with General Surgeons. If satisfactory candidates will be appointed for a second 6 months as House Physicians.

Applications, with copy testimonials, should be sent to the Group Secretary, Lincoln County Hospital, as soon as possible.

LINCOLN. HARMSTON HALL HOSPITAL. (345 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (psychiatry) required immediately for the above Mental Deficiency Institution. There are 3 associated hospitals and 2 hostels providing total accommodation of 942 Beds for mental defectives of all grades and ages. Facilities for postgraduate study in conjunction with Sheffield University available. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. LIVERPOOL REGIONAL HOSPITAL BOARD. Applications are invited for a post of SENIOR REGISTRAR in Dermatology for the period 1st October, 1958–30th September, 1959. Annual reappointment until completion of the normal period of training will be considered thereafter without the need for further application. The person appointed will undertake the major part of his duties in the teaching hospitals, but there are also regular duties in non-teaching hospitals.

Apply by 12th July, 1958, on form obtainable from the Secretary, The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. LIVERPOOL MATERNITY HOSPITAL. Applications are invited for a post of RESIDENT REGISTRAR in Paediatrics for the year from 1st October, 1958, to 30th September, 1959. Annual reappointment thereafter until completion of the normal period of training will be considered without the need for further application.

Apply by 12th July, 1958, on form obtainable from the Secretary, The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LOUTH, LINCOLNSHIRE. COUNTY HOSPITAL. (215 Beds.) GRIMSBY HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER (medical) vacant 1st August, 1958, at this busy General Hospital.

Applications, with full details, together with names of 2 referees, should be addressed to the Hospital Secretary.

LUTON AND DUNSTABLE HOSPITAL. Children's ANNEXE, LUTON, BEDFORDSHIRE. RESIDENT PÆDIATRIC HOUSE OFFICER required. The post is recognised for the D.C.H. and as a second pre-registration post in medicine. The duties include both medical and surgical wards.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to the Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. SENIOR HOUSE OFFICER for Accident Service, including duties in the Hand Infection Unit, required for vacancy mid-July. Post recognised for F.R.C.S.

Applications, stating age, nationality, qualifications and experience, together with copes of 3 recent testimonials, to be sent to the Secretary of the above Hospital as soon as possible.

MAIDENHEAD HOSPITAL, Berkshire. Applications invited for the post of CASUALTY OFFICER (Senior House Officer grade), vacant 1st July. Post recognised for F.R.C.S.

Applications, stating age, qualifications, experience and nationality, with copies of testimonials or names of 3 referees, to Secretary.

MAIDENHEAD HOSPITAL, Berkshire. Applications invited for post of HOUSE SURGEON, vacant 2nd July. Pre-registration post.

Applications, stating age, qualifications and nationality, with names of 3 referees, to Secretary.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant end of June, 1958. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £819 10s. a year, less £150 a year for residential emoluments.

Applications to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the Ophthalmic Department of the above Hospital. Post vacant now. The Hospital is recognised by the Examining Board for the F.R.C.S. and the D.O. Salary £819 10s. a year less £150 a year for residential emoluments.

Applications should be forwarded to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

MAIDSTONE. PRESTON HALL CHEST HOSPITAL, BRITISH LEGION VILLAGE, MAIDSTONE, KENT. Applications are invited for the post of SENIOR HOUSE OFFICER at the above Hospital which contains 330 Beds for treatment of pulmonary tuberculosis and other chest diseases, and includes a major thoracic surgical unit. Married accommodation available. Salary £819 10s. p.a., national scale and conditions.

Applications, stating age, qualifications and experience, with names and addresses of 2 referees, to be sent to the Group Secretary by 30th June, 1958.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE SURGEON. 6 months' appointment. Vacant now. Recognised for F.R.C.S. Salary at the rate of £467 10s.–£577 10s. p.a. A deduction at the rate of £125 a year is made for board and lodging, and other services provided.

Applications should be forwarded, as soon as possible, to the Administrative Officer at the Hospital.

MIDDLESBROUGH. NORTH ORMESBY HOSPITAL. (184 Beds.) SOUTH TEES-SIDE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgery) for Surgical Team No. 2 at the above Hospital.

Applications, stating full details, and giving 2 names for reference, should be addressed to the Hospital Secretary as soon as possible.

MANSFIELD (near), NOTTINGHAMSHIRE. HARLOW WOOD ORTHOPÆDIC HOSPITAL. (338 Beds.) Applications are invited from registered medical practitioners for the post of RESIDENT SENIOR HOUSE OFFICER. The Hospital deals not only with long-term orthopædic, but also with all other types of cases, including traumatic work. The post is recognised for examination purposes by the Royal College of Surgeons.

Applications to Group Secretary, Nottingham No. 5 Hospital Management Committee, Ransom Hospital, Rainworth, near Mansfield, Notts.

MANCHESTER. BOOTH HALL CHILDREN'S HOS-PITAL, BLACKLEY, MANCHESTER, 9. (380 Beds. Recognised for D.C.H.) RESIDENT SENIOR HOUSE OFFICER (surgical). Duties orthopædic and E.N.T. Post vacant 1st August.

Applications, giving names and addresses of 2 referees, to be sent to Group Secretary, from whom further particulars may be obtained.

MANCHESTER. NORTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of REGISTRAR in the Department of Pathology. The Department serves 4 general hospitals and offers excellent facilities in all branches of pathology. The post is recognised for the Diploma in Pathology.

Applications, with names of 2 referees, by 30th June, 1958, to Group Secretary, Crumpsall Hospital, Manchester, 8.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER to the Geriatric Department. Resident or non-resident. Duties are primarily in the active medical wards. Excellent experience is available in the unit which has been developed on modern lines and has available full general hospital facilities.

Applications, stating age, qualifications, present post, experience, and the names of 2 referees, to be forwarded to the Group Secretary at the Hospital immediately.

MANCHESTER, 23. WYTHENSHAWE HOSPITAL. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT CLINICAL PATHOLOGIST (Senior House Officer grade), vacant 21st July, 1958. The post offers opportunity for training in all branches of pathology. Previous experience is not required.

Apply, with full details and the names of 2 referees, to the Group Secretary, Withington Hospital, Manchester, 20.

MANCHESTER REGIONAL HOSPITAL BOARD. The ROYAL INFIRMARY, BOLTON. (238 Beds.) Locum REGISTRAR required immediately for E.N.T. Department for approximately 6 weeks.

Applications, stating age, qualifications and experience, to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

MANCHESTER REGIONAL HOSPITAL BOARD. BOOTH HALL CHILDREN'S HOSPITAL, BLACKLEY, MANCHESTER, 9. (380 Beds.) RESIDENT MEDICAL OFFICER (Registrar grade). Vacant from 1st September. The Hospital is recognised for D.C.H. and is associated with the University Department of Child Health for undergraduate teaching.

Application forms and further particulars may be obtained from the Secretary, to whom completed forms should be sent before 31st July.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE, WITHINGTON HOSPITAL, MANCHESTER, 20. Applications are invited for the post of Locum Tenens REGISTRAR in Surgery for the month of July.

Applications, with full details, to the Group Secretary, Withington Hospital, immediately.

MID GLAMORGAN HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following medical staff vacancies:—

Neath General Hospital (412 Beds)
SENIOR HOUSE OFFICER (traumatic surgery and casualty).
SENIOR HOUSE OFFICER (pathology).
HOUSE SURGEONS.
HOUSE PHYSICIANS.

Bridgend General Hospital, Quarella-road, Bridgend (381 Beds)
HOUSE SURGEONS.
HOUSE PHYSICIANS.

Port Talbot General Hospital, Hospital-road, Port Talbot (85 Beds)
SENIOR HOUSE OFFICER (surgery).

Applications, naming 2 referees, to be addressed to the Group Secretary of the Committee, 8, Wind-street, Neath.

NEWCASTLE GENERAL HOSPITAL. Newcastle upon TYNE HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (general surgery), resident. Recognised for F.R.C.S. diploma.

Applications, together with names and addresses of 2 referees, should be sent to the Secretary, Newcastle General Hospital, Newcastle upon Tyne, 4.

NEWCASTLE REGIONAL HOSPITAL BOARD. Registrar SURGEON (whole-time) for Sunderland Group of hospitals—Ryhope General (282 Beds). Recognised for F.R.C.S.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. Registrar in Physical Medicine (whole-time) for the Sunderland Group of hospitals—Royal Infirmary (300 Beds), General Hospital (470 Beds), and Ryhope General Hospital (282 Beds). Population served 362,630. Post recognised for Part II D.Phys.Med.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the non-resident appointment of SENIOR HOUSE OFFICER in the Department of Bacteriology, at the Royal Victoria Infirmary. The successful applicant will assist in the general work of the laboratory, including blood-transfusion serology. Previous laboratory experience is not essential. The appointment, will be for 1 year and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the non-resident appointment of SENIOR HOUSE OFFICER in the Department of Neurology and Neurosurgery at the Royal Victoria Infirmary. The appointment, which will become vacant on 1st October, 1958, will be for 1 year and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time non-resident appointment of REGISTRAR in the Department of Dermatology at the Royal Victoria Infirmary. The appointment is for 1 year in the first instance and is subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full particulars and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time non-resident appointment of SENIOR HOUSE OFFICER in the Department of Dermatology at the Royal Victoria Infirmary. The appointment is for 1 year and is subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

NOTTINGHAM EYE HOSPITAL. Senior House Officer (ophthalmology) required. Duties to commence immediately. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Resident Pre-registration HOUSE SURGEONS required. Posts vacant June and July.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Applications invited for CLINICAL PATHOLOGIST (Senior House Officer grade), duties to commence end of July. Previous experience in pathology not essential. Opportunities for training in all branches of clinical pathology are afforded in a department serving over 1200 Beds.

Applications, stating age, qualifications, experience, nationality, and names and addresses of 3 referees, to be sent to the Group Secretary by the end of June.

NOTTINGHAM GENERAL HOSPITAL. Senior House OFFICER (orthopædic and fracture) required. Duties to commence about 18th July, 1958. Post offers exceptional experience in traumatic surgery.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Senior House OFFICER (surgery) required. Duties to commence 26th July, 1958.

Applications, stating age, qualifications, experience and nationality, together with copies of testimonials, to be sent to Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Resident Pre-registration HOUSE PHYSICIANS required. Posts vacant June and July. LOCUM required immediately.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (casualty), duties to commence about 26th July. Establishment 3. Recognised for F.R.C.S. Post offers wide experience of casualty work.

Applications stating age, nationality, qualifications and experience, together with copies of testimonials, to be sent to the Secretary, General Hospital, Nottingham.

NOTTINGHAM CITY HOSPITAL. (811 Beds.) Applica-tions are invited for the post of HOUSE SURGEON, vacant immediately. Recognised for pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, together with copies of not more than 3 testimonials, to be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM CITY HOSPITAL. (811 Beds.) Appli-cations are invited for the post of SENIOR HOUSE OFFICER in the Department of Thoracic Surgery. Post vacant 1st July, 1958. Salary £819 10s. p.a. less £150 for residential emoluments. The appointment will be for 1 year.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 testimonials, should be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM. MAPPERLEY HOSPITAL (1087 Beds. Recognised for D.P.M.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR (psychiatry) required. Facilities for postgraduate study in conjunction with Sheffield University available. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NEWARK GENERAL HOSPITAL. Nottingham No. 1 HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (medical) required for above Hospital situated on Great North-road, approximately 20 miles from Nottingham. Post offers good experience. Consultant staff attending Newark Hospital are on 1 or more of the Nottingham Hospitals. Flat available as married quarters. Salary and conditions of service in accordance with Ministry regulations. Duties to commence as soon as possible.

Applications, giving names of 3 referees, should be sent to Group Secretary, Nottingham No. 1 Hospital Management Committee, General Hospital, Nottingham.

NORWICH (near). LITTLE PLUMSTEAD MENTAL DEFICIENCY HOSPITAL. (1000 Beds.) Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER. The Hospital is modern, has a large outpatient service and admits many young patients for short periods for physical and mental investigation. Interest in physical medicine is encouraged. A house is available on the Hospital estate.

Applications, with the names and addresses of 2 referees, to the Medical Superintendent, Little Plumstead Hospital, near Norwich, Norfolk, as soon as possible.

OXFORD REGIONAL HOSPITAL BOARD. Registrar in General Surgery at Northampton General Hospital with some duties in Thoracic Surgery at Creaton Hospital, Northants.

Applications, on forms obtainable from the Secretary, Registrars Committee, 43, Banbury-road, Oxford, should reach him by 5th July, 1958.

OXFORD. THE UNITED OXFORD HOSPITALS. Appli-cations are invited for the post of RESIDENT SENIOR HOUSE OFFICER in the Department of Anæsthetics, which will fall vacant shortly.

Applications on forms obtainable from the Administrator, Radcliffe Infirmary, Oxford, should be received not later than 2 weeks from the date of this advertisement.

OXFORD. UNITED OXFORD HOSPITALS. Applica-tions are invited for 2 posts of NON-RESIDENT REGISTRAR in Obstetrics and Gynæcology, 1 to commence on 1st August and the other on 1st September.

Application forms are obtainable from the Administrator, Radcliffe Infirmary, Oxford, and should be received not later than 3 weeks from the date of this advertisement.

PAISLEY. ROYAL ALEXANDRA INFIRMARY. House SURGEONS (general) required for above Infirmary as from 1st August, 1958. Posts approved for pre-registration practitioners and F.R.C.S.

Applications to Group Medical Superintendent.

PAISLEY. ROYAL ALEXANDRA INFIRMARY. House SURGEON (orthopædic) required for above Infirmary as from 1st August, 1958. Post approved for pre-registration practitioners and F.R.C.S.

Applications to Group Medical Superintendent.

PAISLEY HOSPITALS MATERNITY UNIT. (Thornhill AND BARSHAM MATERNITY HOSPITALS.) Applications are invited from registered and provisionally registered medical practitioners for 2 RESIDENT HOUSE SURGEON posts (obstetrics). Posts become vacant on 1st August, 1958.

Applications to Group Medical Superintendent, Royal Alexandra Infirmary, Paisley.

PLYMOUTH. MOUNT GOLD ORTHOPÆDIC HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER for the Orthopædic and Fracture Service, centring on Mount Gold Orthopædic and Associated Hospitals. Post recognised by R.C.S. Accommodation for married man may be available.

Applications, stating age, qualifications with dates, &c., and with copies of 2 recent testimonials, to be forwarded to the Secretary, Mount Gold Hospital, Plymouth.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

HOUSE SURGEONS, pre-registration posts, vacancies 1st and 23rd June, and 1st July, 1958. Recognised for the F.R.C.S. Greenbank Road Hospital.

In all cases send names of 3 referees and addresses, also state age, nationality, qualifications and experience to Group Secretary, 7, Nelson-gardens, Devonport.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL, Greenbank-road. SENIOR HOUSE OFFICER in Surgery, vacant 8th August, 1958. Recognised for the F.R.C.S.

Applications, stating age, nationality, qualifications and experience, together with names of 3 referees, to be sent to the Group Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of E.N.T. REGISTRAR vacant 9th August, 1958. Duties will be at Queen Alexandra Hospital and associated Units. Post recognised for F.R.C.S. and D.L.O.

Forms of application may be obtained from the Group Secretary, Portsmouth Group Hospital Management Committee, Saint Mary's Hospital, Milton-road, Portsmouth, which should be returned to him duly completed on or before 30th June, 1958. Canvassing will disqualify. Candidates may visit the above Hospital by arrangement with the Group Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital

SENIOR HOUSE OFFICER, General Medicine and Dermatology. Vacant, 1st July, 1958.

Surgery (87 surgical beds)

HOUSE OFFICER (pre-registration). Vacant 24th August, 1958.

Royal Portsmouth Hospital

Surgery (70 surgical beds)

HOUSE OFFICER (pre-registration). Vacant 1st July, 1958.

Orthopædic (104 orthopædic beds)

HOUSE OFFICER (pre-registration). Vacant 14th July, 1958.

Paediatric and Medical (30 beds)

HOUSE OFFICER (pre-registration). Vacant 12th August, 1958.

Saint Mary's Hospital

Surgery (120 surgical beds)

HOUSE OFFICERS (3) (pre-registration). Vacant 28th June, 1958, 9th August, 1958, and 12th August, 1958.

Pædiatric (53 pædiatric beds)

HOUSE OFFICER (recognised for D.C.H.). Vacant 12th August, 1958.

Infectious Diseases Hospital

SENIOR HOUSE OFFICER for 12 months or Locum required with duties also on the tuberculosis wards and the Poliomyelitis Diagnostic and Respiratory Centre. Vacant immediately.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST, St. Mary's Hospital, Milton-road, Portsmouth.

PRESTON ROYAL INFIRMARY. (400 Beds.) Senior HOUSE OFFICER in Orthopædics. Post recognised for F.R.C.S. Vacant 1st July, 1958.

Applications, with names of 2 referees, to Group Secretary, Preston and Chorley Hospital Management Committee, Royal Infirmary, Preston.

READING. BATTLE HOSPITAL. (391 Beds.) Reading AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of RESIDENT JUNIOR HOUSE SURGEON (pre- or post-registration) required in the Accident and Orthopædic Department. F.R.C.S. recognised. Also casualty duties. Vacant immediately.

Apply, stating age, qualifications with dates, nationality, present post, with copy of recent testimonial, to Secretary.

RHYMNEY AND SIRHOWY VALLEYS HOSPITAL MANAGEMENT COMMITTEE.

St. James' Hospital, Tredegar, Monmouthshire. (38 general medicine, 43 chronic sick, and 43 obstetric beds.) Married quarters.

OBSTETRIC HOUSE OFFICER (1st August).

Caerphilly and District Hospital, Caerphilly, Glamorganshire. (Acute general hospital, 226 Beds.) 6 miles from City of Cardiff; married quarters may be available; vacancies on 1st August.

2 HOUSE SURGEONS, 1 with duties also in Orthopædic Department. (Both recognised for F.R.C.S.)

HOUSE PHYSICIAN.

Applications to the Group Secretary, Central Offices, Caerphilly-road, Ystrad Mynach, Hengoed, Glam.

PONTYPRIDD AND RHONDDA HOSPITAL MANAGEMENT COMMITTEE.

East Glamorgan Hospital, Church Village, near Pontypridd (336 Beds and large Outpatient Department. Committee's Base Hospital serving population of 174,000. Recognised for D.Obst.R.C.O.G., F.R.C.S., D.C.H., F.F.A.R.C.S., D.A.)

SENIOR HOUSE OFFICER (medicine), to commence 1st August, 1958.

SENIOR HOUSE OFFICER (obstetrics and gynæcology), to commence 1st August, 1958.

SENIOR HOUSE OFFICER (pædiatrics), to commence 1st August, 1958.

SENIOR HOUSE OFFICER (pathology), to commence immediately.

SENIOR HOUSE OFFICER (anæsthetics), to commence 15th August, 1958.

Llwynypia Hospital, Llwynypia, Rhondda (200 Beds including acute medical and chronic sick beds, serving area population of 112,000.)

SENIOR HOUSE OFFICER (medicine), to commence 1st August, 1958. Person appointed to this vacancy will also be required to undertake duties at the Glyncornel Hospital and have part responsibility for the Group Infectious Diseases Hospital.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent to the Group Secretary, Courthouse-street, Pontypridd.

REDHILL. EAST SURREY HOSPITAL, Shrewsbury-road, REDHILL, SURREY. RESIDENT HOUSE SURGEON (Male). Pre-registration appointment vacant immediately. Opportunity of House Physician's post to follow if required.

Applications to Hospital Secretary.

RHYL. ROYAL ALEXANDRA HOSPITAL. (138 Beds.) Applications are invited from pre-registration or registered medical practitioners for the post of HOUSE PHYSICIAN at the above Hospital. Post vacant 1st August, 1958. Tenable for 6 months.

Applications, together with copies of 2 testimonials, to be sent forthwith to the Group Secretary, Clwyd and Deeside Hospital Management Committee, "Rhianfa", Russell-road, Rhyl.

ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIANS required at Birch Hill Hospital. 3 resident posts available in July.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (surgery) required immediately for busy Surgical Unit. Post recognised for F.R.C.S. qualification and offering excellent experience.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHESTER, KENT. ST. BARTHOLOMEW'S HOSPITAL. MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer grade). 1 of 2 in the department. Post vacant now and tenable for 6 months or 1 year. Recognised for F.R.C.S. Salary £819 10s. p.a.

Applications, stating age, nationality, qualifications and experience, with recent testimonials, to Hospital Secretary.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit. The service consists of 100 Beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital, as soon as possible.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE OFFICER (general surgery) required from 7th July, 1958. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications should be forwarded immediately to Medical Superintendent stating also names of 2 referees.

SALFORD HOSPITAL MANAGEMENT COMMITTEE. ROYAL MANCHESTER CHILDREN'S HOSPITAL and SALFORD ROYAL HOSPITAL. ANÆSTHETIST required (Senior House Officer status) to be resident at the Royal Manchester Children's Hospital, Pendlebury, with duties at Salford Royal Hospital. In addition to training in anæsthesia for general surgery (both adult and children), special facilities are available for gaining experience in anæsthesia for neonatal, neurosurgical and other surgical specialties. The post is recognised for the F.F.A. R.C.S. and encouragement will be given to the successful candidate to work for this examination.

Applications, stating age, qualifications and experience, together with the names of 2 referees, to the Hospital Secretary not later than 28th June, 1958.

SALFORD ROYAL HOSPITAL. (257 Beds. Acute general). SALFORD HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER in Medicine (Assistant Resident Medical Officer) required. Appointment for 1 year—vacant August.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Salford Royal Hospital, Chapel-street, Salford, 3.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in General Medicine, Royal Infirmary of Edinburgh.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in General Medicine, Royal Infirmary of Edinburgh.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited from Women practitioners for the appointment of REGISTRAR in General Medicine at the Bruntsfield and Elsie Inglis Hospitals, Edinburgh, vacant on 1st October, 1958.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited from Women practitioners for the appointment of REGISTRAR in Obstetrics and Gynæcology at the Bruntsfield and Elsie Inglis Hospitals, Edinburgh. The successful applicant may be required to reside in the Elsie Inglis Hospital.

Apply, giving particulars of age, qualifications and previous experience and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in General Surgery at the Dunfermline and West Fife Hospital. The Hospital has 117 surgical beds, including those for E.N.T., ophthalmology, gynæcology, and orthopædic surgery.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Radiodiagnosis to the Edinburgh Northern Group of hospitals.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 5th July, 1958.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Medicine. MARYFIELD HOSPITAL, DUNDEE. Applications are invited for the post of REGISTRAR in Medicine in the Unit of the Professor of Pharmacology and Therapeutics at Maryfield Hospital, Dundee (370 Beds), one of the main teaching hospitals associated with the University of St. Andrews. Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, 430, Blackness-road Dundee, with whom applications must be lodged not later than 5th July, 1958.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance:—

SENIOR REGISTRAR in Hæmatology based at Stobhill General Hospital, Glasgow.

2 REGISTRARS in Surgery based at the Royal Infirmary, Glasgow.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 5th July, 1958.

SCUNTHORPE AND DISTRICT WAR MEMORIAL HOSPITAL. (262 Beds.) SCUNTHORPE HOSPITAL MANAGEMENT COMMITTEE. Immediate vacancy for HOUSE SURGEON (pre-registration) or Senior House Officer according to experience. Busy hospital with large surgical turnover.

Apply to Group Secretary, Scunthorpe Hospital Management Committee, War Memorial Hospital, Scunthorpe, naming 2 referees.

SHEFFIELD. CITY GENERAL HOSPITAL. (658 Beds. Recognised for F.R.C.S. examination). SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT CASUALTY REGISTRAR required immediately. If non-resident the successful candidate to reside at the hospital when on duty (including "on call" duty). Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. CITY GENERAL HOSPITAL. (658 Beds. Recognised for training for F.R.C.S. examination). SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (orthopædics) required immediately. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. LODGE MOOR HOSPITAL. (467 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (infectious diseases) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 30th June, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications invited for the following posts:—

(*a*) OPHTHALMIC REGISTRAR at the Royal Hospital.

(*b*) REGISTRAR in Clinical Pathology. The successful candidate may be required to work in any of the laboratories of the United Sheffield Hospitals.

Applications for both posts, stating age, qualifications and experience, with the names of 3 referees, should be sent not later than 12th July, 1958, to the Chief Administrative Officer, United Sheffield Hospitals, West-street, Sheffield, 1.

SHREWSBURY. EYE, EAR AND THROAT HOSPITAL. SENIOR HOUSE OFFICER (E.N.T.). Duties at E.N.T. Hospital (68 Beds) and Copthorne Hospital (168 Beds). Post recognised for the D.L.O.R.C.S. and F.R.C.S. Vacant immediately.

Applications, with copy testimonials, to the Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. 2 HOUSE SURGEONS required, pre-registration posts, recognised for F.R.C.S., vacant 21st and 29th July.

Applications, with names of 2 referees, to Secretary by 9th July.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. HOUSE PHYSICIAN required for post vacant 29th July. Pre-registration appointment offering considerable experience in general acute medical work.

Applications, with names of 2 referees, to Secretary by 9th July.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum MEDICAL REGISTRAR required 3rd–11th July.

Application, with names of 2 referees, to Secretary.

SKIPTON (near). GRASSINGTON HOSPITAL. (208 Beds.) SENIOR HOUSE OFFICER required for the above Hospital, which provides treatment for tuberculous patients, men and women. Accommodation available for single applicants.

Applications to Medical Superintendent.

SOUTHAMPTON GENERAL HOSPITAL. (465 Beds.) Recognised for F.R.C.S. RESIDENT HOUSE SURGEON required beginning of July (pre-registration candidate eligible).

Applications should be forwarded to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton, with copies of recent testimonials.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (274 Beds. Recognised for F.R.C.S.) ORTHOPÆDIC HOUSE SURGEON (pre-registration candidates eligible). Post offers excellent experience in the treatment of traumatic conditions.

Applications to Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHEND-ON-SEA. GENERAL HOSPITAL. Applications are invited for appointment as SENIOR HOUSE OFFICER to the Orthopædic and Fracture Department. Post vacant 1st August, 1958. The Orthopædic and Fracture Department is the centre for reference of all cases from a large surrounding area, and the post offers excellent experience in all aspects of orthopædic and traumatic surgery under the supervision of and with instructions from the Consultant-in-Charge. Post recognised for the F.R.C.S. Resident or non-resident.

Applications, stating age, qualifications and experience, together with copies of recent testimonials, should be sent to the undersigned by 3rd July, 1958. J. C. FIELD, Secretary.

SOUTHEND-ON-SEA. LANCASTER HOUSE CHEST CLINIC. SOUTHEND-ON-SEA HOSPITAL MANAGEMENT COMMITTEE. Locum SENIOR REGISTRAR required for the whole or part of the period 21st July–8th September, 1958. Previous experience in chest work essential. Accommodation available if required.

Applications immediately to the Secretary, Management Committee Offices, General Hospital, Rochford, Essex.

SOUTH TEES-SIDE HOSPITAL MANAGEMENT COM-MITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) at the above-named Group of hospitals. This appointment provides excellent experience in all branches of surgery, including thoracic, neuro- and plastic surgery. Single accommodation available.

Applications, together with copies of 3 testimonials, to be sent to the Group Secretary, North Ormesby Hospital, Middlesbrough, within 14 days.

ST. ASAPH HOSPITAL, St. Asaph, Flintshire. Appointment of HOUSE SURGEON. Duties divided between ophthalmology (16 Beds), E.N.T. (12 Beds), and oral surgery (4 Beds).

Applications, stating age, qualifications and experience, accompanied by 2 recent testimonials, to be sent forthwith to the Group Secretary, Clwyd and Deeside Hospital Management Committee, Rhianfa, Russell-road, Rhyl.

STAFFORD. STAFFORDSHIRE GENERAL INFIR-MARY. (176 Beds—Recovery Unit 32 Beds.) HOUSE SURGEON. Pre-registration post. Vacant 9th July. At end of service the successful applicant will be considered for appointment to a pre-registration post of House Physician if he or she has not held such an appointment.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

STIRLING AND CLACKMANNAN HOSPITALS BOARD OF MANAGEMENT AND NATIONAL HEALTH SERVICE EXECUTIVE COUNCIL FOR THE COUNTIES OF STIRLING AND CLACKMANNAN. Applications are invited for 2 joint appointments as SENIOR HOUSE OFFICER in Surgery at Clackmannan County Hospital and TRAINEE GENERAL PRACTITIONER in the Alloa area. The appointments will be for 2 years and the successful applicants will spend a total of 1 year at Clackmannan County Hospital and 1 year as a Trainee General Practitioner with a selected principal. The salary for the post will be £819 10s. for the first year and £850 for the second year. A car allowance may be payable in addition.

Applications, with names of 2 referees, should be sent to the Group Medical Superintendent, Royal Infirmary, Stirling, not later than 12th July, 1958.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE OFFICER (general surgery) required. Recognised for F.R.C.S. Post vacant very shortly.

Detailed applications, with copy testimonials, to Hospital Secretary, North Staffordshire Royal Infirmary, Stoke-on-Trent.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. Applications invited for HOUSE OFFICER (medical), vacant early July. Recognised pre-registration post.

Detailed applications to the Secretary at the Hospital.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. HOUSE PHYSICIAN (pædiatrics) required. Post vacant very shortly. Pre-registration. Hospital recognised for D.C.H.

Detailed applications, with copy testimonials, to Hospital Secretary.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (815 Beds.) 2 combined pre-registration house appointments tenable for 12 months. (HOUSE PHYSICIAN—HOUSE SURGEON.) 6 months as House Surgeon to a Consultant General and Thoracic Surgeon and 6 months as House Physician to 2 Consultant Physicians. Work includes general medicine, cardiology, general surgery, thoracic and cardiac surgery. No casualty work. Recognised for F.R.C.S.

Applications to Hospital Secretary.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (685 Beds.) RESIDENT SENIOR HOUSE PHYSICIAN (paediatrics) required. (Senior House Officer grade.) Post vacant mid-June, 12 months' appointment. Post recognised for D.C.H.

Applications, with copy testimonials, to Hospital Secretary, as soon as possible.

STOCKPORT INFIRMARY. (163 Beds.) Applications are invited for the post of HOUSE OFFICER or SENIOR HOUSE OFFICER (medicine). Vacant 8th July, 1958.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

STOCKPORT INFIRMARY. Locum Casualty Officer (Senior House Officer), resident or non-resident, for 2 weeks from 30th June, 1958.

Applications to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

STOCKPORT AND BUXTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following pre-registration posts:—

Stockport Infirmary (163 Beds)

HOUSE OFFICER (surgery), vacant now. Recognised for the F.R.C.S.

Stepping Hill Hospital (529 Beds)

HOUSE OFFICER (medicine). Vacant 31st July, 1958.
HOUSE OFFICER (medicine). Vacant 21st August, 1958.
HOUSE OFFICER (obstetrics). Vacant 1st September, 1958.

Recognised for the D.Obst.R.C.O.G.

Applications, with full particulars and copies of 2 testimonials, to the Group Secretary, 59B, Shaw-heath, Stockport.

STOCKTON AND THORNABY HOSPITAL, Stockton-on-Tees, Co. Durham. (130 Beds.) Applications are invited for the following appointments:—

SENIOR HOUSE OFFICER (general surgery). Vacant end of July.
SENIOR HOUSE OFFICER (casualty). Vacant immediately.
Pre-registration HOUSE OFFICER (general surgery). Vacant end of July.

Full Consultant staff. Posts recognised in connection with F.R.C.S. examinations.

Applications to the Group Secretary, North Tees-side Hospital Management Committee, Sedgefield General Hospital, Sedgefield, Co. Durham.

STONE, BUCKINGHAMSHIRE. ST. JOHN'S HOSPITAL. St. John's and Manor House Hospital Management Committee. Applications are invited for the post of SENIOR HOUSE OFFICER at this Mental Hospital. Facilities for training in psychiatry are available. Previous experience in psychiatry is not necessary.

Applications, giving full details and the names of 2 referees, should be addressed to the Physician-Superintendent.

SULLY HOSPITAL, Sully, Glamorganshire. (Thoracic centre of 324 Beds.) SENIOR HOUSE OFFICER (surgical). Applicants primarily interested in general surgery considered. Experience will be gained in investigation and treatment of chest and heart conditions.

Form of application from Group Secretary, 44, Cathedral-road, Cardiff.

SWANSEA. MOUNT PLEASANT HOSPITAL. (240 Beds.) Glantawe Hospital Management Committee. Applications are invited for the resident post of SENIOR HOUSE OFFICER in obstetrics for the maternity unit of 40 Beds at the above Hospital. The post, which will become vacant on 12th August, 1958, is for a period of 12 months and is recognised for the D.Obst.R.C.O.G. examination.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, should be sent to the Hospital Secretary not later than 7th July, 1958.

T. E. Jones, Group Secretary.

TAUNTON (near). TONE VALE GROUP HOSPITAL Management Committee, Norton Fitzwarren, near Taunton, Somerset. Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER with duties mainly at Tone Vale Hospital, a modern psychiatric hospital of 1100 Beds, treating all forms of mental and nervous disorder and including a unit for psychotic children. The post provides an excellent opportunity for postgraduate training in psychiatry, including outpatient clinic work, and particularly the study of child psychiatry not only with psychotic children in the unit at the Hospital, but also attendance at child guidance clinics in the county. Every facility is provided for study for the D.P.M. and facilities are also available for research and opportunities for work for the M.D. degree. Previous holders of this post have been granted special study leave. A detached house is available on the Hospital estate at a reasonable charge or accommodation can be provided in the Hospital for a single person. The appointment will, in the first instance, be limited to 3 years and will be subject to the terms and conditions of service for hospital medical staffs (present salary scale £852 10s.–£1182 10s. p.a.).

Applications, giving details of age, qualifications and experience, together with the names and addresses of 2 referees, should be forwarded to the Group Secretary within 10 days of the appearance of this advertisement.

TAUNTON AND SOMERSET HOSPITAL, Taunton, Somerset. (423 Beds.) HOUSE OFFICERS (general surgery) required. 2 pre-registration posts recognised for F.R.C.S., vacant 30th June, 1958, and 8th July, 1958, respectively.

Applications, stating age, nationality and qualifications, to the Group Secretary, Taunton Hospital Management Committee, c/o Musgrove Park Hospital, Taunton.

TAUNTON AND SOMERSET HOSPITAL, Taunton, Somerset. (423 Beds.) HOUSE OFFICER (pædiatrics) required. Pre-registration post. Recognised for D.C.H. Vacant 19th July, 1958.

Applications, stating age, nationality and experience, to the Group Secretary, Taunton Hospital Management Committee, c/o Musgrove Park Hospital, Taunton, immediately.

TAUNTON AND SOMERSET HOSPITAL. Senior HOUSE OFFICER (anæsthetics) required. Post vacant now. Is recognised for F.F.A.R.C.S. and D.A. A Registrar in Anæsthetics is also employed in the South Somerset Clinical Area, in which the above is the principal general hospital.

Applications, stating age, nationality, experience in anæsthetics (if any), together with the names of 2 referees, to the Group Secretary, Taunton Hospital Management Committee, Musgrove Park Hospital, Taunton, immediately.

TAUNTON AND SOMERSET HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (casualty and orthopædic).

Applications, stating age, nationality and qualifications, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Musgrove Park Branch, Taunton, Somerset.

TREDEGAR GENERAL HOSPITAL, Tredegar, Monmouthshire. HOUSE SURGEON required at above Hospital from 11th July. Commodious family flat available.

Apply to Group Secretary, Rhymney and Sirhowy Valleys Hospital Management Committee, Central Offices, Cærphilly-road, Ystrad Mynach, Hengoed, Glam.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. (Regional Thoracic Centre.) Applications invited for positions of SENIOR HOUSE PHYSICIAN and SENIOR HOUSE SURGEON. Salary £819 10s. p.a. £150 p.a. charged for accommodation.

Address written applications, giving full personal particulars, details of experience and 2 names and addresses for reference, to W. Bowring, Group Secretary, Pinderfields General Hospital, Wakefield.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Locum Tenens SENIOR HOUSE PHYSICIAN required for the period 17th–31st July, inclusive. Salary £15 19s. per week. Charge for accommodation at the rate of £150 p.a.

Address written applications, giving full personal particulars, details of experience and 2 names and addresses for reference, to W. Bowring, Group Secretary, Pinderfields General Hospital, Wakefield.

WAKEFIELD. STANLEY ROYD HOSPITAL. Applications invited for post of JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER in Psychiatry. Accommodation available for a single person.

Address written applications, giving full personal particulars, details of training, experience, &c., and 2 names and addresses for reference, to W. Bowring, Group Secretary, Pinderfields General Hospital, Wakefield.

WARRINGTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER (geriatrics) (Male or Female) for active geriatric units at Whitecross Hospital and Aikin Street Hospital, Warrington. Good clinical experience and study time for higher qualifications. Scale of salary £819 10s. p.a., less a deduction of £150 p.a. for residential emoluments.

Applications to be forwarded to Henry L. Boot, Group Secretary, c/o General Hospital, Warrington, Lancs.

WARRINGTON INFIRMARY. Applications are invited from Males and Females for the post of RESIDENT CASUALTY OFFICER (graded as Junior Hospital Medical Officer) at the above Hospital. The post is recognised for the F.R.C.S. Scale of salary £852 10s.–£55–£1182 10s. less a deduction of £170 for residential emoluments. A whole-time Senior Hospital Medical Officer is in charge of the Department.

Applications, stating age, experience and qualifications, should be forwarded to—

Henry L. Boot, Group Secretary,
Warrington and District Hospital Management Committee,
c/o General Hospital, Warrington, Lancs.

WARWICK HOSPITAL, Lakin-road, Warwick. (284 Beds.) SENIOR HOUSE OFFICER in Anæsthetics required on 1st July, 1958. The post is recognised for D.A. and F.F.A.R.C.S., and is resident.

Applications, with 2 recent testimonials, to be forwarded to the Medical Superintendent.

WARWICK (near). KING EDWARD VII MEMORIAL Chest Hospital. (Diseases of the chest. 228 Beds.) SENIOR HOUSE OFFICER, resident desirable. Hospital is modern with Thoracic Surgery Unit.

Applications to Medical Superintendent.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL Hospital. (211 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital. This is a pre-registration post and is recognised for F.R.C.S. Salary according to the National Health Service scale. Post vacant mid-July.

Please send copies of recent testimonials, with applications, to the Administrator.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL Hospital. (211 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (Senior House Officer grade) to the Watford Hospitals. Post vacant 1st July.

Applications, together with copies of not more than 2 recent testimonials, to the Administrator.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL Hospital. (211 Beds.) Applications are invited for the post of HOUSE PHYSICIAN at the above Hospital. Pre-registration post vacant mid-July. Salary in accordance with National Health Service scale.

Please send applications, with copies of 2 recent testimonials, to the Administrator.

WESTON-SUPER-MARE GENERAL HOSPITAL. (104 Beds.) Applications are invited from duly qualified medical practitioners for the pre-registration appointment of HOUSE SURGEON (resident). Vacancy 15th July, 1958.

Applications, stating age, qualifications, together with names and addresses of 2 referees, should be addressed to the Secretary, Weston-super-Mare Hospital Management Committee.

WESTON-SUPER-MARE GENERAL HOSPITAL. CASUALTY OFFICER (Senior House Officer grade) required at the above Hospital, vacancy 1st July, 1958. The appointment is recognised for F.R.C.S. examinations.

Applications, stating age, qualifications and experience, together with names and addresses of 2 referees, should be addressed to Group Secretary, Weston-super-Mare Hospital Management Committee.

WEYMOUTH AND DISTRICT HOSPITAL. Locum MEDICAL REGISTRAR (Registrar grade), Male or Female, required from 1st July, 1958. Salary £19 5s. per week. Residence available if necessary.

Applications stating age, qualifications, experience and enclosing copy testimonials, to Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (medicine) based at Whelley Hospital, duties also at Wigan Infirmary. Good experience for higher qualifications.

Applications to Secretary, Knowsley House, Wigan.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. CASUALTY OFFICER (Senior House Officer grade) required. Vacant 28th July. Post recognised for the F.R.C.S. The appointment will be for 6 months in the first instance.

Applications, with copies of 2 testimonials, to the Group Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (327 Beds.) HOUSE OFFICER (anæsthetics). Post vacant 1st July. The Hospital is recognised for the F.F.A. R.C.S. and D.A.

Applications, with copies of 2 testimonials, to the Group Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. House SURGEON in General Surgery required, Male or Female, for post vacant 18th July. Recognised for F.R.C.S. Pre-registration post.

Applications, stating age, nationality, qualifications with dates and copies of recent testimonials, to Secretary.

WOLVERHAMPTON AND MIDLAND COUNTIES EYE INFIRMARY. SENIOR HOUSE OFFICER required. 100 Beds and busy Outpatient Department. Post vacant 1st July. Recognised for F.R.C.S. and D.O. examinations.

Applications to Secretary, Eye Infirmary, Compton-road, Wolverhampton, as soon as possible.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (An associated hospital of the Birmingham University Medical School.) Pre-registration HOUSE OFFICERS (general medicine). Vacancies occur on 2nd and 9th July, and 1st August.

Apply, giving age and qualifications and copies of 2 testimonials, to the Secretary.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (An associated hospital of the Birmingham University Medical School.) Pre-registration HOUSE OFFICER (paediatrics). Post recognised for D.C.H. Vacant 27th July.

Apply, giving age and qualifications and copies of 2 testimonials, to the Secretary.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (An associated hospital of the Birmingham University Medical School.) Pre-registration HOUSE OFFICERS (general surgery). Vacancies occur 2nd, 9th, and 17th July. All posts recognised for F.R.C.S.

Apply, giving age and qualifications and copies of 2 testimonials, to the Secretary.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (An associated hospital of the Birmingham University Medical School.) ORTHOPÆDIC SENIOR HOUSE SURGEON for Fracture and Orthopædic Department. Post recognised for F.R.C.S. Vacant immediately.

Apply, with 2 testimonials, to the Secretary.

WORKINGTON INFIRMARY, Cumberland. (150 Beds, pre-registration post.) HOUSE OFFICER or SENIOR HOUSE OFFICER for orthopædic, surgical, and casualty duties. Vacant now.

Applications, with dates, and names of 2 referees, to Group Secretary.

WORTHING HOSPITAL, Lyndhurst-road, Worthing, SUSSEX. (210 Beds. Acute general.) Applications are invited from registered medical practitioners for the appointment of RESIDENT CASUALTY OFFICER (Senior House Officer grade) vacant late August. The post is recognised for the revised Fellowship regulations in respect of the 6 months' training required by candidates for the Final Fellowship examination. Duties entail some responsibility for 52 Beds (mainly surgical) at the Hospital's Recovery Annexe situated 3 miles from the main Hospital.

Applications, stating age, qualifications, nationality and experience, together with copies of 2 recent testimonials, to be forwarded to the Hospital Secretary, as soon as possible.

A. V. OAKTON, Group Secretary,
Worthing Group Hospital Management Committee.

WORTHING HOSPITAL, Lyndhurst-road, Worthing, SUSSEX. (210 Beds. Acute general.) Required early July. HOUSE PHYSICIAN.

Applications from either registered medical practitioners or pre-registration candidates, stating age, qualifications, experience, nationality and enclosing copies of 2 recent testimonials, to be forwarded to the Hospital Secretary immediately.

A. V. OAKTON, Group Secretary,
Worthing Group Hospital Management Committee.

WORCESTER ROYAL INFIRMARY AND RONKSWOOD HOSPITAL. HOUSE SURGEON (pre-registration or otherwise) required for General Surgery post which offers wide and varied experience, with outpatient clinics at the Worcester Royal Infirmary (213 Beds) and inpatient work at Ronkswood Hospital (312 Beds). The post is recognised for the F.R.C.S. examinations.

Applications to the Secretary, Ronkswood Hospital, Worcester.

WORCESTER ROYAL INFIRMARY. (213 Beds.) Locum SENIOR HOUSE OFFICER (medical) required for Resident Medical Officer's duties from 4th to 18th July, 1958.

Applications to Hospital Secretary.

WORCESTER ROYAL INFIRMARY. House Surgeon (pre-registration or otherwise) required immediately for Orthopædic Department of this busy general hospital of 213 Beds. The appointment offers wide and varied experience.

Applications to Hospital Secretary.

WORCESTER. RONKSWOOD HOSPITAL. Resident ANÆSTHETIST (Senior House Officer status) required mid-August for post which is recognised by the Faculty of Anæsthetists. Duties cover all specialties. Married accommodation available.

Applications, with names and addresses of 3 referees, to be sent to the Hospital Secretary.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the post of PÆDIATRIC HOUSE PHYSICIAN at the above Hospital, to commence 1st August, 1958. The appointment is recognised for the D.C.H. and for pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, together with copies of 2 recent testimonials, should be addressed to the Group Secretary, Wrexham, Powys and Mawddach Hospital Management Committee, Maelor General Hospital, Wrexham, Denbighshire.

WREXHAM. MAELOR GENERAL HOSPITAL (591 Beds), and WAR MEMORIAL HOSPITAL, WREXHAM (230 Beds). Applications are invited for HOUSE SURGEON posts at the above Hospitals, to commence duties on 1st August, 1958. The appointments are recognised for the Diploma of F.R.C.S. (England, Edinburgh, and Ireland) and are pre-registration posts.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Wrexham, Powys and Mawddach Hospital Management Committee, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. MAELOR GENERAL HOSPITAL (591 Beds), and WAR MEMORIAL HOSPITAL, WREXHAM (230 Beds). Applications are invited for HOUSE PHYSICIAN posts at the above Hospitals, to commence 1st August, 1958. The appointments are recognised for pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, together with copies of 2 recent testimonials, should be addressed to the Group Secretary, Wrexham, Powys and Mawddach Hospital Management Committee, Maelor General Hospital, Wrexham, Denbighshire.

WREXHAM (near). TREVALYN MANOR MATERNITY HOSPITAL, ROSSETT, near WREXHAM. (47 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st September, 1958. The Hospital is a Part II Midwifery Training School and deals with normal and abnormal midwifery.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. WAR MEMORIAL HOSPITAL. (230 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in the Orthopædic Department of the above Hospital. The post is a residential one and affords particular facilities for postgraduate study. Successful applicant will be allowed to attend for 2 days a month at the Robert Jones and Agnes Hunt Orthopædic Hospital, Oswestry. The Hospital is recognised for the Diploma of F.R.C.S. (England, Edinburgh, and Ireland).

Applications, stating age, nationality, qualifications, and experience, together with copies of 2 recent testimonials, to be addressed to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

YEOVIL GENERAL HOSPITAL, Somerset. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (medicine and casualty). Yeovil Hospital is the main acute general hospital in the Group, and calls for good experience.

Applicants should state their age, experience and qualifications, together with the names of 3 referees, which should be sent to the Group Secretary, South Somerset Hospital Management Committee, 71, Higher Kingston, Yeovil.

YORK. COUNTY HOSPITAL (general, 266 Beds) and CITY HOSPITAL (general, 256 Beds). LOCUMS required in General Medicine and General Surgery (Senior House Officer grade).

Apply immediately to Group Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

YORK MILITARY HOSPITAL (Civilian Wing, 60 Beds). SENIOR HOUSE OFFICER required immediately, resident or non-resident. There are 30 general surgical and 30 medical beds. The Hospital is associated with the County Hospital (general, 266 Beds), where relief casualty and emergency work and relief work for House Surgeons may be undertaken and where residence can be provided.

Applications, stating age, nationality, experience, qualifications, and names of 2 referees, to Group Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

CORK SANATORIA BOARD. Vacancy for House SURGEON, St. Stephen's Hospital, Sarsfieldscourt. Remuneration £516–£676 p.a.

Application forms and particulars may be obtained from the County Manager, Courthouse, Cork, with whom completed applications should be lodged not later than 5 P.M. on Monday, 30th June, 1958.

NEW YORK. NEW ROCHELLE HOSPITAL, New ROCHELLE, NEW YORK, U.S.A. (383-Bed general community hospital.) Approved by the Joint Commission on Accreditation of Hospitals. Also approved by the American College of Surgeons and American Medical Association for Internship and Residency training. Only graduates from approved university schools accepted. Internships available for the 1-year term commencing 1st July, 1958. Stipend is $200 per month plus complete maintenance.

Apply Superintendent.

CANADA. KINGSTON GENERAL HOSPITAL, Kingston, ONTARIO. Vacancy for a SENIOR RESIDENT in Obstetrics and Gynæcology, for 1 year, commencing 1st July, 1958. Salary scale $2760–$3360 p.a., including residential emoluments, depending on previous experience. Very suitable for an emigrant doctor preparing for Canadian Council or Canadian Specialist examinations. Applications from Senior House Officers or Middle Registrars with the D.Obst.R.C.O.G. or M.R.C.O.G. would be favoured.

Write with curriculum vitæ to Professor EDWIN ROBERTSON, F.R.C.O.G., Kingston General Hospital, Kingston, Ontario.

Public Appointments

DERBYSHIRE COUNTY COUNCIL. Applications are invited from Male or Female medical practitioners for the whole-time superannuable appointment of SENIOR MEDICAL OFFICER FOR SCHOOL HEALTH. The successful candidate will work under the direction of the County Medical Officer of Health who is also the Principal School Medical Officer. The duties will be largely administrative in connection with the School Health Service, but will include the functions of a Health Education Officer and such other duties as may be assigned. Possession of the D.P.H. (or its approved equivalent) is essential, and experience in school health and mental deficiency work is advantageous. The salary is £1520–£50–£1570–£55–£1955 p.a., plus a car allowance. Office accommodation will be provided at the County Offices, Matlock.

Applications, with the names of 2 referees, should be submitted to the undersigned by 30th June. (Forms are not provided but conditions of service will be provided on request.)

J. B. S. MORGAN, County Medical Officer of Health.
County Offices, Matlock.

DERBYSHIRE COUNTY COUNCIL. County Health DEPARTMENT. ASSISTANT MATERNAL AND CHILD WELFARE MEDICAL OFFICER AND SCHOOL MEDICAL OFFICER. Applications are invited from registered medical practitioners for a whole-time superannuable post in the East of Derbyshire. Salary, £1050–£50–£1200–£55–£1475 p.a. Car allowance.

Particulars and forms of application are obtainable from Dr. J. B. S. MORGAN, County Medical Officer, County Offices, Matlock, to whom they should be returned by 30th June, 1958.

DURHAM COUNTY COUNCIL. Health Department. ASSISTANT MATERNITY AND CHILD WELFARE MEDICAL OFFICER. Applications are invited from registered medical practitioners (Female). Commencing salary £1050 p.a., rising by annual increments of £50 and £55 to £1475. Travelling expenses will be paid in accordance with the scale approved by the Whitley Council.

The appointment is subject to certain conditions, particulars of which may be obtained from the County Medical Officer of Health, Shire Hall, Durham, to whom applications, together with the names of not more than 3 referees, should be sent. Canvassing members of the Council is prohibited.

J. K. HOPE, Clerk of the County Council.

MIDDLESEX COUNTY COUNCIL. County Health DEPARTMENT. SENIOR ASSISTANT MEDICAL OFFICER (Male) required initially in Area 6 (Wembley and Willesden). Whole-time for administrative and clinical work. Approval by Minister of Education for ascertainment of educationally subnormal children desirable. Diploma in Public or Child Health advantage. Required to act as Deputy Medical Officer of Health for Borough of Willesden for 40 % of whole-time. Salary as for mixed appointments, £1693 13s. 4d.–£2058 13s. 4d. Established, subject to medical assessment. Prescribed conditions.

Apply, stating age, qualifications, experience, and names of 2 referees, to Joint Area Medical Officers, 215, Chevening-road, Kilburn, N.W.6, by 5th July. (Quote X.620 L.) Canvassing disqualifies.

WEST BROMWICH. COUNTY BOROUGH OF WEST BROMWICH. HEALTH DEPARTMENT. Applications are invited from registered medical practitioners for the temporary post of ASSISTANT MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER for a period of 9 months, commencing on 1st September, 1958. Possession of the D.P.H. or previous experience in public health, though desirable, is not necessary. The salary will depend on the experience and qualifications of the successful candidate, the minimum being £1050 p.a.

Applications, with full particulars and the names of 2 persons to whom reference can be made, should be made to the Town Clerk, Town Hall, West Bromwich, not later than 7th July, 1958.

GOVERNMENT OF THE FEDERATION OF NIGERIA. MALARIOLOGIST required to carry out malaria surveys in the field, organise and supervise chemotherapeutic trials, and train junior technical staff. The Federal Malaria Service has well-established reputation, its research scope is wide and full of interest. Possession of D.P.H. or D.T.M. and H. an asset.

Appointment:—

(*a*) On short-term contract with inclusive salary from £1338 to £2286 a year, or from £1536 to £2286 for officer possessing D.P.H. On completion of contract a gratuity is paid of £37 10s. for each completed period of 3 months' service (including leave).

(*b*) From National Health Service with inclusive salary from £1128 to £1950 a year, or from £1326 to £1950 for officer possessing D.P.H., candidate retaining superannuation rights and receiving gratuity (taxable) of 20 % of aggregate of salary.

Starting salary assessed according to length of postgraduate experience.

Quarters at low rental. Free return passages for officer and wife. Return passages for children, to age 18, provided cost does not exceed that of 2 adult return passages in any 1 tour of service. Children's (separate domicile) allowance of £75 a year for each child under eighteen, ceasing if children join parents in Nigeria. Income-tax at local rates. Local leave permissible and generous home leave after each tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD.117/14/056).

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointments as Appointed Factory Doctor are vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of applications*
SHERBURN ..	YORK	5TH JULY, 1958
MALTON ..	YORK	5TH JULY, 1958
EAST LINTON ..	EAST LOTHIAN ..	5TH JULY, 1958

SOUTH CORK BOARD OF PUBLIC ASSISTANCE. Vacancy for ANÆSTHETIC REGISTRAR, St. Finbarr's Hospitals. Remuneration: £862 10s. p.a.

Application forms and particulars may be obtained from the County Manager, Courthouse, Cork, with whom completed applications should be lodged not later than 5 P.M., on Tuesday, 15th July, 1958.

General Practice

For an ***Executive Council post*** *(England and Wales) apply on form* **E.C.16A** *obtainable from the council. Mark envelope "Vacancy."*

MYTHOLMROYD, YORKSHIRE. Applications are invited for VACANCY (Urban and Rural). List at present approximately 1335. Residential and main surgery accommodation available for purchase. Appointed successor required to commence on 1st October, 1958. Apply on Form E.C.16A to the undersigned, from whom further particulars may be obtained, not later than 5th July, 1958.

C. H. STABLER, Clerk, West Riding Executive Council.
5, St. John's North, Wakefield.

PORTSMOUTH, HAMPSHIRE. Applications invited for VACANCY, due to resignation, in Central Portsmouth (Intermediate area). List at present 1400. Residence/surgery available for purchase. Successful applicant would be required to take over practice 1st September, 1958. Apply on Form E.C.16A, to the undersigned not later than 2nd July.

A. R. GODDARD,
Clerk of the Portsmouth Executive Council.
66/74, Pearl Buildings, Commercial-road, Portsmouth.

Miscellaneous

Physicians trained in diseases of the chest or holding an M.R.C.P. degree or equivalent who might be interested in sanatorium or chest clinic work in the Province of Ontario, Canada, are invited to apply to Ontario House (attention Mr. H. G. Donaldson), 12, New Burlington-street, London, W.1, for information regarding opportunities. Salary range $5000–$8000, depending on experience. Applications must be in by 10th July so arrangements may be made for interview.

Canada. Required: Director, accredited Child Psychiatrist to pioneer programme for residential treatment emotionally disturbed children (15 children aged 6–12). Non-profit society, excellent professional and community backing. Good personnel practices and salary. Possible university affiliation.—Write Personnel Committee, Children's Foundation, c/o 1625 West Eighth-avenue, Vancouver, B.C., Canada.

Required. Registrars or Senior House Physicians under age 35 with either 3 or more years' training in medicine or 3 or more years' training in paediatrics interested in moving permanently to areas in and near New York City for opportunities to practise in medical groups. Beginning annual salary $10,000, including loans for transportation if needed. Full details at interviews in London 1st, 2nd, and 3rd July, with physician from New York.—Make appointments through Sir ALLEN DALEY, 24, Edith-road, London, W.14.

MICROBIOLOGIST

Required by:
LEDERLE LABORATORIES DIVISION,
CYANAMID OF GREAT BRITAIN LIMITED

There is a vacancy at our Gosport plant for a Microbiologist with a degree in either bacteriology or microbiology, preferably with previous experience, but this is not essential as training will be given to the successful applicant.

Work involves antibiotic assays, sterility testing and vitamin assays of pharmaceutical, surgical, and veterinary products.

Hours of work, 9 A.M.–5.15 P.M., Monday–Friday.

There is a pension scheme.

Fully detailed applications, which will be acknowledged, should be addressed to the Personnel Manager, Lederle Laboratories Division, Cyanamid of Great Britain Ltd., Fareham-road, Gosport, Hants.

Doctor in West End private practice able to do occasional evenings and week-end duties.—Address, No. 409, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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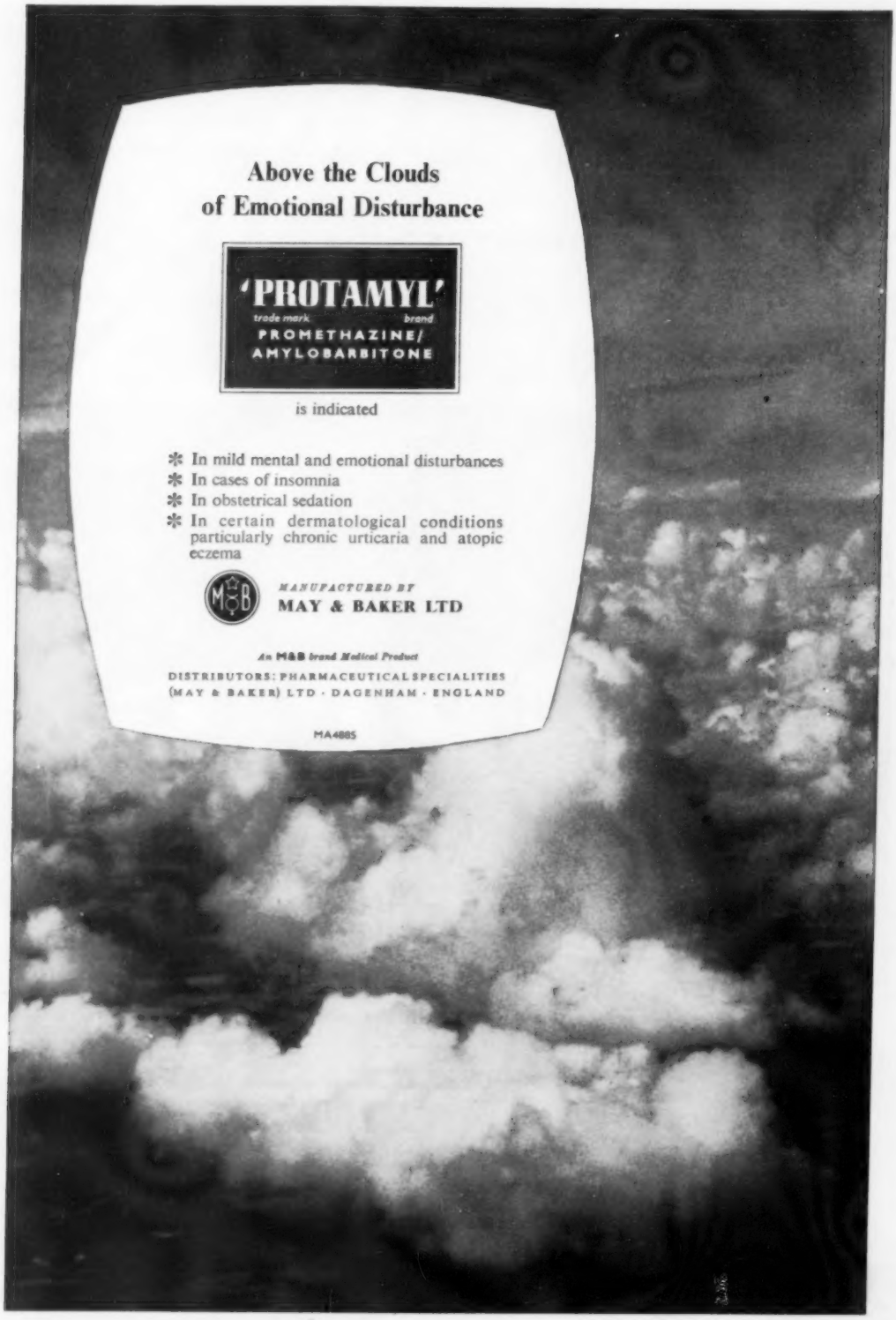
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